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From Mrs. C. H. Richmond
May, 1890

THREE LECTURES,

DELIVERED BEFORE THE

MICHIGAN STATE AGRICULTURAL SOCIETY,

AT ITS

Annual Meeting, at Lansing, January 17, 1865.

The Undeveloped Regions and Resources of the State of Michigan,

BY

D. BETHUNE DUFFIELD, ESQ., DETROIT.

The State Agricultural Society; Its Means and Ends,

BY

A. S. WELCH,

Principal of the State Normal School.

THE SOILS AND SUBSOILS OF MICHIGAN,

BY

PROF. A. WINCHELL,

Of the State University of Michigan.

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THE
UNDEVELOPED REGIONS AND RESOURCES
OF THE
STATE OF MICHIGAN,

With some Practical Suggestions in Reference to their Early Occupancy and Development.

A LECTURE,

PREPARED FOR THE MICHIGAN STATE AGRICULTURAL SOCIETY, AND DELIVERED AT LANSING, JANUARY 17, A. D. 1865, BY

D. BETHUNE DUFFIELD.

The object of the following address is to submit in outline sketch, an exhibition of the undeveloped regions and resources of the State of Michigan—accompanying it with such few practical suggestions, as may contribute somewhat to their early occupancy and development.

A theme so broad, and withal so attractive, exacts on the part of him who would treat it with any degree of forbearance towards his hearers, a very large sacrifice, both of material and suggestion.

However indifferent to all matters of State development we may have suffered ourselves to remain through the palmy days of the past, when "our peace flowed like a river," and all was happiness and harmony along our borders, it will be conceded, that in a time like that through which as a people we are now passing, this indifference must of necessity cease. When the wild echoes of destructive war are rolling through a nation, they not only summon her brave men to the field, but they at the same time command her wise men into council; requiring

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of them a careful reconnoisance of the future, and a prompt inauguration of such policies as are suited to the exigencies of her imperiled condition.

These unhappy voices are to-day still ringing in our ears, and while as we hope, they breathe the herald notes of a victorious and regenerating peace, they yet utter their words of warning, admonishing each State to repair all her waste places, to throw open to the fruitful influences of the sun all her silent forests, to excavate from sunken vein and mountain wall, her stores of undisturbed mineral wealth, and as rapidly as possible, to concentrate upon her soil, a busy and industrious population.

The debt of the United States, from an amount, which four years ago, was scarcely more than nominal, has suddenly, under the terrible necessities of a rebellion, involving the national existence, been swelled to figures and proportions almost beyond the capacity of mortal management, and this debt can only be borne, and honorably discharged through the *increased* wealth of the several States composing the great Federal Union; for as the aggregate wealth of communities composes that of the State, so the aggregate wealth of the several States, makes up the grand total of resources for the United States. Nor is this public debt all that rests upon the citizen. The debts of the several States, all more or less increased by the exigencies of the war; the debts of the various counties; the township debts; and the yet further indebtedness of the individual citizen, must with its interest, all be added to the great national debt, before we can fully realize our financial condition and its claims upon us. Were I able in reliable statistics here to place before you, the towering pile of figures thus composing the debit side of the nation, I should certainly win a ready assent to the statement just made, that something besides *existing* wealth, must cancel these vast obligations of our day. It cannot be drawn from the fabulous resources of Wall Street, nor from the green boxes of retired millionaires. It cannot by any stroke of financial wisdom be evoked from the great reser-

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voirs of European capital; nor called into existence by rubbing the modern Aladdin lamp in the form of a Bank Engraver's steel plate; but it must and can only proceed from wealth *newly created;* from that which is to-day locked fast in the mine, hid in the forest, or slumbering still in the untilled acres of our virgin soil. Immigration must be encouraged, settlements promoted by judicious public improvements, communities built up in regions now awaiting their approach; and the strong arm of man universally quickened into active and productive industry.

The giant growth of the United States sprang originally—and in a very few years as we measure the life of a great nation—from a few scattered settlements on its bleak and forbidding coasts. These settlers came not in crowded fleets, flanked by the iron clads of modern times, and sustained with all the resources of later days; but crowded in frail barks, like those which *two centuries* ago wrestled with the perilous ocean, were compelled on making land to kindle their fires, and build their huts in the presence of a savage race, who threatened them with early expulsion, or extermination.

Nevertheless, they courageously planted their feeble settlements; and these gradually approaching each other, formed first communities, then hamlets, towns, counties and colonies, and ultimately in the progress of their political development vast States, out of which in due time sprang that final triumph of an enlightened civilization, our own Federal Union.

Two important lessons are here put on record for the benefit of the nation as it still moves resistlessly forward in its wide circuit of self-expansion, and they may be thus stated, viz:—the early and full acquaintance of every new State with its own resources, and the rapid concentration of men upon the soil with a view to settlement and development.

Every separate State, therefore, should make haste to examine her own home resources, their capacity of increase, and the best mode of developing those yet lying dormant. By an intelligent policy of this sort, when fairly and broadly put into operation,

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each State will be enabled over and above her mere *quota* of Federal and State taxation, to make early and easy contribution towards the payment of that large debt which the people have resolved to meet rather than snffer the Government to drift away into floating fragments of State contention and national imbecility. For when this debt shall have been canceled, the nation will have achieved its final and grandest triumph. And this mode of triumphing over difficulties apparently insuperable, is in accordance with the true American spirit, which halts at no obstacle, and spares no effort in the accomplishment of its purpose. This it is that inspires her people to span the unnavigable flood with the airy but massive railroad bridge, to tunnel the mountain rather than climb it, and which will yet enable them to defy the ocean, and encircle the globe with the vocal wires of the electric telegraph.

It will be our purpose so to apply these monitions of the past to the present affairs of our own State, as to render apparent the practical duty not only of the legislator, but of every citizen who is interested in the public welfare, or jealous of the national honor.

The State of Michigan consists of two Peninsulas, known as the northern and southern, the land area of which is 56,243 square miles, or 35,995,520 acres; being 1.91 per cent. of the total area of the United States. The population in 1860 was 751,956. The northern Peninsula embraces all that portion of the north-western territory lying between lakes Michigan and Superior, and east of the rivers Menominee and Montreal, which form the boundary between it and the State of Wisconsin. It is at present divided into eight counties. Its extreme northern situation, prohibiting its use for agricultural purposes, (except to a very limited extent, in the vicinity of settlements,) its population have been hitherto confined to the development of the minerals peculiar to the region. The undeveloped portion of the mineral region embraces the larger part of the counties of Ontonagon, Houghton and Marquette. The remaining portion yet unsettled will be referred to hereafter.

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The southern half of the State is a magnificent Peninsula, 280 miles in length, and 200 miles broad, in its extremest width. Surrounded on all sides, except its southern, by the waters of the great lakes, dashing like vast seas, it possesses a coast line of one thousand miles; and this, with another thousand miles on the Upper Peninsula, gives to the State over 2,000 miles of coast. This estimate does not include the coast lines of the islands, in either of the three great lakes which wash the borders of the State. This entire coast line is securely accessible at various points, and by its natural and improved harbors, together with the St. Mary's and Welland canals, opens the mineral, agricultural and other products of both Peninsulas, to the trade of the world.

The southern or settled part of the Lower Peninsula is almost exclusively an agricultural region; possessing such varieties of prairie openings, and timbered lands, as are rarely found in any other portions of the United States. It is also beautifully diversified with lakes, aboundiug in fish; and displays every variety of timber known to the climate.

The coal and salt basins are found in this Peninsula; and from developments already made, their products must soon take rank with the most important of our State.

The recent incipient establishment of manufactures among us, involving the use of all the different varieties of hard and soft timber, (except the pine of commerce,) such as oak, maple, butternut, basswood, &c., is bringing into active demand all this heretofore neglected class of our woods, which are reckoned as superior to those found in any other State. Massachusetts annually carries away from us immense quantities of them for the use of her shovel and other manufactures—thus bringing prominently into market a prolific source of wealth which has hitherto lain dormant.

But as the unsettled portions of the State constitute the main subject of our reflection, we proceed at once to a consideration of them.

The northern or Upper Peninsula, excepting the different

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towns and localities dependent on the mines, is wholly an unsettled region, and comprises upwards of nine millions of acres, or fourteen thousand square miles—a tract larger than the three States of Massachusetts, Connecticut and Rhode Island.

Aside from its mineral wealth—now only beginning to be developed—its value may be said to consist chiefly in its timber, and not in any agricultural capacities.

This timber is of that class which is absolutely necessary to the mines, and will be so appropriated and used. Yet there are districts within the mineral region of the Upper Peninsula which are covered with valuable hard timber, among which may be seen some of the finest tracts of birds-eye maple any where to be found. This has been observed at Grand Island, the Ance, and at Portage Lake.

The remaining portion of the Upper Peninsula (not the mineral,) is valuable principally for its pine timber, although in the region of the two Peninsulas of the Big and Little Bay de Nocquet, there is to be found a very superior hard timber, with a good soil for agricultural purposes. This is perhaps the exception as to this sort of land in the Upper Peninsula. All of it has recently been taken up by parties interested in the location there of iron furnaces.

Passing down on to the *Lower* Peninsula, we find the following unsettled portions, viz:

1st. A small region on the lesser Peninsula, between Saginaw Bay and the River St. Clair, comprising portions of Huron, Tuscola, Sanilac, Lapeer and St. Clair counties.

2d. Nearly the whole of the Southern Peninsula north from the centre line of Gratiot, Montcalm, Mecosta, Newaygo and Muskegon counties; or north from a line midway between the Detroit and Milwaukee Railroad and the Muskegon river, and the Chippewa river, of Saginaw county.

This whole region, embracing thirty-four counties, possesses an area of thirteen millions of acres, or over twenty thousand square miles—equal in extent to the three States of Connecticut, Massachusetts and Vermont, which together, comprise but

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twenty thousand square miles. If to this we add the nine millions of acres, or the 14,000 square miles of unsettled lands in the Upper Peninsula, we have a total unsettled territory of twenty-two millions of acres, or thirty-four thousand square miles.

The great extent of this region will appear by a comparison of it with the three principal counties composing the kingdom of Great Britain and Ireland. It is two thousand six hundred and seventy-six square miles larger than Scotland; one thousand four hundred and ninety-two square miles larger than Ireland, and three-fifths the area of England. These are the unsettled regions, merely, of our State.

The unsettled portion of the Lower Peninsula, as above delineated, is almost a wilderness; the exceptions in the interior being the very limited settlements induced by the lumber business. Nevertheless, there is included in this area numerous promising points along the coasts of Lakes Huron and Michigan, such as Tawas City, Alpena and Harrisonville, on Lake Huron; and on Lake Michigan, Stoney Creek, Pentwater, Pere Marquette, and settlements at Big and Little Sauble rivers, Manistee, Portage, Aux Bec Scies and Grand Traverse Bay. It should be here remarked that a very rapid settlement has been latterly growing up in the region of Traverse Bay, and on the extreme north-western portion of the Lower Peninsula, where, notwithstanding its high latitude, the proximity of the vast waters of Lake Michigan, and other influences not yet fully comprehended, seem to render it a peculiarly desirable region for agricultural purposes, and for the raising of fruit.

Several settlements in the interior should also be noted in Isabella, Mecosta and Newaygo counties; such as Big Rapids, on the Muskegon, which is already reached by a State road; Isabella City, and one or two others. The southern portions of Newaygo and Oceana counties, and the northern parts of Gratiot and Muskegon counties, ought fairly to be reckoned within the settled regions of the State, although the *actual* set-

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tlements are as yet very sparse, all being drawn thither by the lumber interest of those localities.

The unsettled portion of the lesser Peninsula above described, as lying between Saginaw Bay and the River St. Clair, and by school-boys sometimes denominated "the thumb" of the State, is now being settled to a considerable extent by Canadians, attracted thither principally by the value of the timber, and the fact that the lands were for some time offered at the lowest graduation prices fixed by the United States Government. This law, however, was repealed in 1862, on the passage of the Homestead Law.

This region may be classed with the pine timbered portion of the State, and possesses great value as a field for lumbering, the timber consisting principally of pine, hemlock and oak. Yet it is not unsuited to agricultural purposes, as is indicated by settlements already referred to. In this region and within the limits of Huron county, and at Point Aux Barques, are found quarries of valuable grit or grindstones, and also flagstones. Several stones weighing upwards of three tons each have already been taken out by the proprietors; and the stones are said to be well adapted not only to flagging, but also for window caps, sills and water-tables. Its color is pronounced preferable to that of the Ohio free-stone, and when wrought, has much the appearance of the Waverly stone. It is said also to contain less iron matter than the Ohio stone, and is consequently less likely to stain under the action of the weather.

I may here remark that the enterprising people of Bay City have now in contemplation the construction of a line of railroad south-easterly from that place and about thirty-five miles in extent, through the counties of Tuscola and Lapeer, to a point on the line of the Port Huron and Milwaukee road, now being reörganized for construction, and thence through to the River St. Clair, and by the Grand Trunk and its connections to the various markets of the East. This road, if built, will unlock the timber treasures of Tuscola and Lapeer counties especially,

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and would quickly open to settlement the large tracts of valuable land along this proposed route.

Before proceeding to give the topographical character of *the northern portion* of the Lower Peninsula, and not including the region just described, it may not be inappropriate to remark, that the reports of the early U. S. surveys of this region, which a few years since were discovered to be fraudulent, indicated to a very large extent a district of inaccessible and uninhabitable swamps and worthless land.

The discovery of these frauds led to a rèsurvey by the Government of this entire region. These rèsurveys were made by well-known citizen of the State, among whom were the late William A. Burt, a man whose name is now forever identified with his profession, the Hon. Lucius Lyon, now deceased, and Mr. Orange Risden, now residing in Saline, in this State. To these gentlemen, we are originally indebted for the valuable information we now possess in reference to the character and resources of this part of the State, and which for so long a time lay beclouded under these fraudulent surveys. How much injury has been done to the State in the way of delaying its settlement, in consequence of this betrayal of trust by the original surveyors, we are only of late beginning to estimate. Doubtless we have lost by means of it, the benefits of at least fifteen or twenty years of pioneers' and settlers' labors in this direction.

This northern portion of the Southern Peninsula as we have already bounded it, is composed of two divisions, which we may appropriately designate as the Eastern and Western Slopes of the Peninsula, and all parts of which are abundantly and suitably watered by stream and lake.

The principal of these streams are the western branches of the Saginaw, the Rifle river, the Aux Gies, the Aux Sable and its tributaries, Thunder Bay River, and the Sheboygan, all of Lake Huron; Boardman's river, of Grand Traverse Bay; the Aux Bec Scies, the Manistee and its tributaries, and the Big and Little Sauble, of Lake Michigan; the Pere Marquette,

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White river, the Muskegon, and some of the waters flowing into Grand river.

These streams are invaluable, nay, indispensable to the future development of this entire region. Each one of these emptying into Lake Michigan, and so of all the streams along the entire western coast of the Peninsula, has, at it mouth, as will be seen by reference to the map, a natural lake or harbor, admirably, and apparently providentially designed to facilitate the holding of logs brought down these various streams, to the places of manufacture and shipment. In view of the impossibility of booming logs outside, amid the rough waters of Lake Michigan, and the impracticability of retaining them in the streams themselves, until converted into lumber, it will be seen how important and valuable a feature these lake outlets are to the entire timbered region from which they take their source, and through which they furnish the facilities of floatage.

The eastern slope of this portion of the Peninsula, which embraces all the regions watered by the streams above named, as flowing into Lake Huron, in respect to its agricultural adaptations, and having regard only to its general features, is for the most part ieferior to most other portions of the State. The chief value of the land located north of Saginaw Bay, on this slope, consists in its pine timber, which ranks generally with the best timber of the State. An exception, however, should here be made of certain territory, embracing nearly two counties, which is a vast sandy pine barren, covered with a scanty growth of scrub pine, and supposed to be unfit for cultivation, (Oscoda and Crawford.)

This eastern slope remains yet largely unexplored, except with reference to pine timber, and lying as it does geologically, discoveries may hereafter be made of importance and value.

Extensive and valuable beds of marble have been discovered in the county of Presque Isle, and the lands are owned by parties who expect soon to bring the same into practical use.

Superior wate-lime, in beds sufficient for all practical purposes, have also been found in this region; and a lively inquiry

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is now making in respect to the possibility of discovering sources of petroleum springs or wells in the county of Alpena, and vicinity, as well as farther south in the rapidly developing county of St. Clair.

During the last two years very extensive beds of plaster have been discovered on Tawas Bay, and about forty miles from Saginaw. It covers a tract of 690 acres of land, and has been pronounced by those who have examined it, *inexhaustible*. A few rods back from the shore, where it is now worked, the bed is found to be ten feet thick, increasing rapidly in thickness as you recede from the shore. Thirty rods back from the present opening, an excavation has been made to the depth of eighteen feet without reaching the bottom. The entire bed is five feet above the water level of Lake Huron, and is readily and inexpensively drained. This plaster is almost entirely free from foreign ingredients, of a much purer quality than that of Ohio, and can be ground at half the expense of the latter. This mine of wealth is being industriously opened by its owners; several buildings having been erected, a good dock built, a saw-mill, planing and shingle machine put in operation, and other improvements begun. Capital applied to its development, could not fail, even under the disadvantages of the present scarcity and high price of labor, to reap very large returns.

In this region and north-west of Tawas Bay, is a tract of beautiful undulating and well watered lands, embracing several townships in extent, which has by experiment, been already found well adapted to agricultural pursuits.

Along the coast of Lake Huron are extensive and valuable fishing grounds, very remunerative to those who engage in this business, and highly attractive to capital. They must ere long be made to yield large amounts of wealth to those who shall prosecute them on a liberal scale and with systematic energy.

The counties of Gladwin, Clare, Isabella and Midland, upon the western branches of the Saginaw river, and extending to the Bay, including the southern part of Bay county, and constituting a portion of this Eastern Slope, possess all the advan-

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tages of this new region, in respect to timber and agricultural resources. Timber settlements are springing up within their limits, attracted there by this particular interest. Did time permit, much might be said in detail as to the resources of these counties, especially Midland and Isabella, the latter of which is agriculturally, one of the very richest of our northern counties. Except for the retarding influence of the Indian Reservations, which are located in this vicinity, this county would ere this have been far in advance of her present condition. The settlements in the two counties last named, including also the county of Gratiot, are intimately connected with the Saginaw Valley, whose lumber establishments are mainly dependent on them for their annual supply of logs.

The Western Slope, embracing the territory north of the mouth of the Muskegon river, and along its waters, including all that region already referred to as watered by the Manistee and other rivers emptying into Lake Michigan, is by far the best portion of northern Michigan for agricultural purposes.

Its favorable position in respect to the ridge running north and south, and dividing the waters of lakes Huron and Michigan, whose surrounding waters afford to it a peculiarly mild and even tempered climate, together with its rich soil and large tracts of hard timber, interspersed with pines, combine to make it a peculiarly desirable region for all settlers devoting themselves to the cultivation of the ground.

The Grand Traverse region, already so well and favorably known, embraces a territory almost exclusively adapted to agriculture, and is now being quite rapidly settled. The surprising returns of this region for the last two or three years, cannot fail to have arrested the attention of every observing citizen; and conclusively demonstrate, that it must soon take rank with the very first agricultural portions of the State. The abundance of its hard wood, (principally beech and maple,) its proximity to Lake Michigan, and its noble bay, give more than ordinary value to its lands; and in connection with the existing

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large demand for wood, cannot fail very materially to aid in the settlement of the country embraced within its limits.

The Grand Traverse region, so called, may be said to extend from the mouth of the Aux Bec Scies river eastward to the head waters of the Manistee, and northward to Grand and Little Traverse bays, including the slender Peninsula west of Grand Traverse.

From Traverse City, in a south-westerly direction, a chain of beautiful lakes is found, forming the head waters of the Aux Bec Scies river. West of these are several quite large lakes lying near the coast, the principal of which is Crystal Lake, covering an area of 15 square miles, with deep, pure and cold water, surrounded by high banks, and capable of readily floating the immense quantities of timber now standing round about it, to points of shipment near the coast of Lake Michigan, and from which it is securely separated by a narrow strip of high sand banks, about half a mile in width.

Upon the banks of this beautiful sheet of water, and about seven miles from the Aux Bec Scies river, a settlement composed of stirring citizens of Ohio has latterly been made. These men, while opening the country on which they have planted themselves, have taken care to provide substantial institutions of learning for their children, and provisions for the foundation of a college have already been made.

The communication of this settlement (which bears the name of Benzonia,) with Lake Michigan, is by the waters of the river just mentioned; yet, in the improvement of the country, Crystal Lake may be made largely available, as its western limits are only two miles from the harbor at the mouth of the Aux Bec Scies river, where a town under the name of Frankfort has been organized, and where substantial improvements have been commenced, with a view of securing not only to that region but to the marine of the entire coast, a superior and permanent harbor of refuge.

The settlement at Traverse City, through its enterprising founders, Hannah, Lay & Co., is too well known to need any

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description here. Its lumber and agricultural interests have already converted it into one of the most important points in the State, and its future growth bids fair to be rapid, and in the character of its population, valuable to the State at large. During the last two years, whole townships lying between Traverse City and Frankfort have been settled and organized.

Other thriving towns have sprung up in this region, among which are Elk Rapids, Northport, now a port of entry, and Glen Arbor, all which have received an impetus in their growth from the wood trade with Chicago, and her passing steamers. Four hundred steamboat arrivals are registered at Northport for each of the last three or four years; and during the last year there has been cut and shipped to the Chicago market, by Elk Rapids and Traverse City upwards of twenty million feet of lumber.

So far as settlers have entered this region, but one opinion prevails in respect to the desirableness of it for farming purposes. Fruit and horticulture are also most successfully carried on, and there is every promise that this northern portion of the State, will soon be found equally productive in these respects with that further south. Some facts having a bearing on this statement might here be given; such as this, that potatoes can be safely left in the hills, all winter, and be dug out for use as required. This was the case, as I have been informed, with 150 bushels at Elk Rapids last winter. The early and deep fall of snow peculiar to the region, and the shelter of the forests seem to prevent the frosts from penetrating the ground to any depth, while the waters surrounding it contribute largely to temper their severity. Last winter when the thermometer was at 40° below zero in Milwaukee, it stood at only 14° below at Frankfort; and when 29° below zero at Detroit, it was only 7° below at Traverse City. There is in fact, no portion of the comparatively unsettled regions of the State, which offer such marked advantages to the settler as that just described.

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Leaving the limits of the Grand Traverse region as above defined, we come into the pine regions along the Manistee, and the Big and Little Au Sable rivers. This region is almost exclusively occupied for lumbering purposes, possessing its settlements and some organized towns and villages, adjacent to which some considerable farming has been done. The settlements at the mouths of the streams on Lake Michigan have sprung from the lumbering interest; and all these streams are furnished, at or near their mouths, with those valuable lake booms already described; such as the Manistee, the Big and Little Au Sable, Pere Marquette, Pent Water, White river and Muskegon. These lumber settlements, however, at the mouths of rivers, have little or no influence in the way of opening up or settling the regions back of them; and although they are becoming quite extensive, and are carrying on a large trade with Chicago, nevertheless, in looking at this region as a whole, we must reckon it as still a part of the unsettled portion of the State.

The interior portion of this western slope, lying south of the limits of the Grand Traverse region, and extending to and beyond the Muskegon, and remote from the coast, possesses, so far as known, many advantages besides the lumber lining its streams, in reference to which only it has as yet been explored. A favorable fact in connection with it, as a whole, is that in constructing a road through it from Grand Rapids to Grand Traverse, only one mile of swamp was passed in the distance of 150 miles.

In the valley of the Muskegon, settlements are springing up, and several towns of some importance already exist there; and no little attention is beginning to be paid to the interests of agriculture.

Taking our stand, then, at a common centre of this entire part of the Peninsula, say at Houghton Lake, in Roscommon county, we see stretching eastward in Iosco and Ogemaw counties, the fine farming and pine regions already described; to

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the south, the counties of Gladwin, Clare, Midland and Isabella, with the different peculiarities already awarded *them;* to the northeast, the region of Thunder Bay, with its vast and heavy masses of pine—the Au Sable of Lake Huron intervening with its larger power of floatage, and penetrating the pine tracts north of Houghton Lake.

These tracts on the head waters of the Au Sable and the Manistee (both of which streams here run fifteen miles southwardly and parallel with each other—the Manistee then deflecting southwesterly through a varied region of pine and hard wood into Lake Michigan) extend northwardly, with the valley of the Cheboygan, as far as the Straits of Mackinaw. To the westerly and southwest, we have the region just referred to as comparatively unexplored, but containing a large amount of valuable timber, and extending down to the pine regions of the coast; and to the northwesterly the Grand Traverse region already delineated at some length.

Having thus taken a cursory bird's-eye view of the *interior* of this northern region, it may not be uninstructive to extend the range of our vision along its coast line. Commencing at the mouth of the Muskegon river, which supports a village of that name, and passing northerly along the coast, we have a region of low land, with various sorts of timber upon it. Next, we have White river, which boasts several settlements along the borders of White Lake, which forms its mouth. Then still northwardly, we pass through the fine farming region of Oceana county, which here thrusts itself quite down to the Lake, and after passing through a similar region traversed by Stony Creek and the Pentwater, (excepting the sand bluffs at Little Point Au Sable,) we reach the mouth of the Pere Marquette river. Thence along the coast northerly we have a stretch of bleak sand bluffs embracing the region of Big Point Au Sable. Passing then the mouths of the Big and Little Sable rivers, at which points are two new and thriving villages, known as Lincoln and Hamlin, the former at the mouth of the Little Au Sable, and the latter at the mouth of the Big Sable, we reach

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the mouth of the Manistee; which, with its town, is already a point of importance. This river, which takes its rise far in the interior, in the county of Otsego, may be considered as the southern and southeastern boundary of the Grand Traverse region. Leaving the Manistee, we find the hard wood of this beautiful region, extending directly down to the coast, and skirting it northward as far as the region of Little Traverse Bay, indicating the superior soil we have already accredited to this part of the State. Passing round through the Straits, we find the coast of Lake Huron presenting no features worthy of especial notice, until we reach Thunder Bay, which is a beautiful and broad sweep of water, with fine advantages as a lumber site, and holding an immense body of pine in its rear. Thence southerly to Saginaw Bay, the coast is generally low and uninviting, presenting no attractions excepting the different lumber settlements and fishing points, which need not be here enumerated.

Having thus, by our somewhat imperfect description, laid before the eye, these vast unsettled regions, we proceed to refer to some of the causes which have operated to debar settlement from them, and then to suggest some modes of action in connection with their future.

The Indian Reservations, particularly in Isabella county, at Little Traverse and Pere Marquette, and also in Mason and Oceana counties, have for a number of years embarrassed and excluded settlement. Some of the very best lands in this vicinity were thus tied up for a number of years, much to the annoyance of *bona fide* settlers who, seeking their possession, were compelled to turn aside and locate elsewhere. But, as is now understood, these reservations for the most part, run out in July next, and so the restrictions referred to bid fair at last to be removed.

Another agency, and perhaps the most injurious in its consequences to the region we have been considering, has been the extensive retirement or reservation of lands, growing out of our railroad grants. Had the roads only been constructed in

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good faith, and within the time prescribed by the acts regulating the same, and devoting the lands to this purpose, no serious mischief would probably have ensued; for the roads would themselves have opened the wilderness to the settlers, and drawn them in by multitudes. But as this was not done, and the time for building was extended, and the lands were still kept out of the reach of the settler, and in the hands of speculating corporations, who preferred private values in stock and bonds, to public values, in the form of growing communities and settled towns, along the lines of their prescribed routes, the observing and incoming settler has been turned adrift, and the doors of this region indefinitely barred against his entrance.

Indeed, all that has been done hitherto in the construction of railroad routes in the State, has been inspired by the desire to secure a route *through* and *over* its borders; not penetrating and bearing the tide of settlement into its interior regions, but carrying it forward, and at lightning speed, into the States of Illinois, Wisconsin, Iowa and Northern Missouri. This policy, so far as these railroad companies are concerned, was undoubtedly for *their* best interests, and is so far commendable. But, (excepting the benefit conferred on those portions of the State through which they run, and that is by no means small,) this policy is none the less detrimental to the State, in respect to localizing improvements and settlements. Many if not all of our Western States, like Wisconsin and Illinois, in the judicious construction of their railroads, as well as by special efforts directed towards the securing of settlers from abroad, have rapidly filled and built up their unsettled territory; while Michigan, through which the currents so attracted have poured, has been passed by, receiving little if any of the living tide.

In proof of the statement that the exclusively "through" character of our roads has largely aided these new States at our expense, we need only refer to the fact, that in some of the newly settled portions of our State, such as the county of Montcalm, settlers from Wisconsin who had first been whirled

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in thither, and actually settled, have subsequently retraced their steps, though at much additional expense, and chosen their homes in the very wilderness of our own State. What they wanted was a region furnished with timber. Michigan was the spot they were really seeking after, but they were borne through it without a chance to halt and examine its attractions.

The roads, however, to which we refer, being *designed to open the country*, were strengthened for their object by these special grants of lands, and not left to the chances of private capital. Capital in respect to enterprises of this sort, is timid, and will not generally consent to build a road, unless it sees that a lucrative traffic is ready to beat the rail as soon as laid. Therefore, there is no excuse for those who, aided and commissioned by these extraordinary resources, *to open up* the yet unbroken regions of the State, and let in active life and busy settlement, still suffer themselves to stand in default before the people, demonstrating that it is their *own*, and not the public welfare, for which they are most concerned. The State, where they are satisfied that due and fair progress has not been made by those corporations who have assumed to make these lands available for the purposes of giving us new roads, should refuse further extension of time, and allow them to die of their own limitation, which will be in the month of June, 1866.

They should then take these lands back into their own hands, by applying to Congress for such modification of the original act of Congress, as will save them to the State for railroad purposes, and this Congress would no doubt readily consent to do. The mode of carrying out this measure might, in brief, be stated thus:

Let the proposed act of Congress, modifying the original act, provide that these lands should all be devoted to their original purpose; but that the General Government should be authorized to sell the lands at the present minimum price, or at a higher minimum rate, say $2 50 per acre, as might be thought best; that the proceeds of these lands should constitute an in-

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terest-bearing fund, in the hands of the General Government, as trustee for the State of Michigan; that the State of Michigan should be authorized to control that fund whenever she wished *to aid bona fide capital* in its legitimate efforts to build substantially these same lines of road.

The expression, "substantially the same lines of road," is used, because these lines can be shortened very materially, and still answer every purpose. The longest lines were resorted to, as is very well known, in order to secure the greatest amount of lands.

Now the practical view to take of this matter is, to make these lands available as far as possible, for the best and permanent interests of the State. Defaulting corporations must give way to the paramount claims of the people, whose vital interests demand that her unoccupied lands be opened to settlement at the earliest day practicable. By the plan suggested, the lands are saved to the State for railroad purposes; the General Government has the use of the money derived from sales until the same shall be required for actual use; the State is less likely to squander the fund; *bona fide* capital will soon appear, and joining its means to the fund thus formed, the roads *will be built;* while, if operators without capital, are left to scheme for the construction of the roads on the lands *alone,* another decade of years will scarcely see another ten miles of road. Let us, therefore, have done with further trifling on this important subject.

One of these routes the interests of the State require should be *immediately* constructed, and that is one connecting Saginaw with the Bay de Nocquet and Marquette railroad, by way of the Grand Traverse, which at Traverse City is 115 miles only, and at Frankfort about 120 miles, in a direct line from Saginaw. This would probably prove our shortest line to Lake Superior, and it could be substantially covered by modifications of the routes of the Amboy, Lansing and Traverse Bay Railroad Company, or the Flint and Pere Marquette Railroad Company. Many pressing reasons may be adduced in support

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of the early building of such a road, some of which I beg leave here to submit.

As is well known to the people of Michigan, a railroad has already been constructed from Bay de Nocquet, on the north end of Green Bay, to Marquette and the iron region of that county.

The importance of a direct connection with Lake Superior is such, that the people of Chicago are now taking active steps for the building of a railroad from Green Bay to Bay de Nocquet, so as to secure to them a summer and winter connection with Marquette, on Lake Superior.

By reason of our peninsular position, *we* cannot get a winter connection with Lake Superior; but this, after all, in a commercial point of view, is not essential, because the iron ore, which is the one product to be transported, and which is brought out at Bay de Nocquet, cannot be carried to *advantage* by rail beyond the water line. Here it must halt for manufacture into iron, either at Bay de Nocquet, or pass ovor the lake to our peninsular coast, at some point where abundance of timber, and easy facilities for shipping can be obtained; such points, for instance, as Traverse City, or Frankfort, where wood abundant for this purpose, and superior harbor accommodations, are to be had.

The absence of wood at Chicago or at any intervening point on the proposed railroad line from Green Bay to Bay de Nocquet, precludes the idea of advantageously transporting this ore elsewhere than to the points named above.

Moreover, the construction of a railroad north-westerly through the central part of this portion of the State, will necessarily secure to us all the advantages which appropriately and legitimately belong to the manufacture of the iron, the sale and conversion of the wood, and the prosperous opening and settlement of a large territory, which would thus naturally and speedily take place. The distance of road to be thus constructed, is but a trifle more than that proposed by Chicago capitalists, which secures to them only *a connection* with Lake

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Superior, without the manufacturing and other advantages just referred to, as being thus secured to us. For it will hardly be claimed that the proposed Chicago line can successfully carry either ore or freight in the winter; and in the summer the competition of water communication would dismiss all expectations of anything like an extended business over this railroad line.

The enterprise of opening a communication to Saginaw, has already had the attention of the Legislature, in connection with a State road between Saginaw and the Grand Traverse region; but the recent completion of the Bay de Nocquet and Marquette railroad renders this proposed new communication between these two points *an imperative necessity.*

Looking at the future importance of the State's iron interests, and the development of its northern unsettled regions, there seems to be no measure or enterprise, which makes such large claims on the generous and fostering care of the Legislature as this. For the fact appears, that notwithstanding the generosity of Congress and the State, and the continuous efforts of those among us who appreciate the great importance of opening up this portion of the State, still almost nothing has as yet been practically accomplished, unless it be the diversion of a very large portion of the public lands from the hands of actual settlers, into the control of those who, whatever may have been their private schemes, have utterly failed to accomplish the important ends proposed by these State and national benefactions. It might be well for us, therefore, to consolidate, or otherwise so dispose of the land grants already conceded to the Grand Rapids and Indiana, the Amboy, Lansing and Traverse Bay, and the Flint and Pere Marquette Railroad Companies, (at least so far as the northern portion of these several routes are concerned,) as would speedily accomplish this highly important end.

The truth is, Michigan has been too long indifferent to the railroad projects most closely allied with her own interests. Without doubt, by even a small proportion on our part, of that

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measure of effort which we have seen made by other States in their behalf, we might also have secured a large proportion of their immigration, and so converted our present wildernesses into smiling settlements. Some irregular and spasmodic efforts have been occasionally made, it is true, and no little proclamation of our resources now and then set forth in the public prints; but it has generally been of such a character, as to be destitute of much real or permanent value. Indeed, although it may seem ungracious so to declare, yet it is nevertheless true, that a large proportion of our citizens are to-day wholly or very largely ignorant of the value of our unsettled regions—quite as much so as they are of the resources of any of the States lying West of us.

Hence the apathy that prevails on this subject, and the actual *inability* of citizens to attract the settler, even if they would, into our still unoccupied and valuable lands. The mere owners of large tracts of pine timber, are not interested particularly in the promotion of settlements, for the reason that their timber goes to distant markets, and is carried to the coast without the aid of roads, or the ordinary modes of civilized communication.

But the true interests of the State will not longer allow this condition of things to continue. Active and sufficient measures for the ends contemplated must be immediately initiated. The State, if she would have her lands sold and occupied, must act on the same practical principles, as the individual land-holder desiring to sell, and who by free but judicious expeditures, advertises his possessions, arrests the eye of the settler, draws him to his particular locality, and so with comparatively little outlay, rapidly populates and improves his most secluded tracts.

Although the State now holds under the swamp land grants no inconsiderable amount of desirable lands, [not less altogether than ———— acres,] still the largest portion of the unsold valuable lands, within the limits of the State, yet remain in the hands of the General Government. The principal part of the *irreclaimable* swamp lands belonging to the State, are

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located in the eastern portion of the Upper Peninsula, where by reason of the severity of the climate, and their peculiar location, settlements can scarcely ever be expected. But we hazard the remark, that under the influences of future settlements, the larger part of the remainder of this class of lands may be made available and desirable to purchasers, meanwhile they need careful supervision and control.

The process of disposing of the United States government lands above referred to, is through the five local Land offices at Detroit, Saginaw, Ionia, Traverse City and Marquette, and of the State lands through the State Land office, at Lansing.

These offices are designed only to give title to applicants for lands as they present themselves; no system or plan of spreading information in respect to them, or of soliciting purchasers or inviting settlements, having ever been engrafted upon their land agencies by the General Government. Those of us familiar with the existing arrangement, can hardly realize that strangers, and especially foreigners, do not equally with ourselves understand its workings; while the fact is, that non-residents desiring to purchase lands, often wander into the State and out of it, without having succeeded in obtaining even the preliminary information necessary to the accomplishment of their purpose. Inquiring settlers of this kind are now daily passing through Detroit, in search of good lands for farming purposes, with no one to point them to the region or county in which they may be found.

In the absence of any encouraging information furnished them at the threshold of the State, and with no prospect of obtaining it elsewhere, there is little inducement for them blindly to explore the country in search of lands, which even when discovered, are frequently found already in the hands of others. This condition of things seems to demand the serious consideration and prompt action of those entrusted with the State's welfare. Every one of these thrifty settlers, and every colony of settlers who can be secured to the State, are in times such as these, well worth every effort and every reasonable expendi-

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ture of means in that direction. The attractions of the Central South are beginning, as never before, to turn the course of settlement from the West—a fact to which we would do well to take heed. Yet when we take into consideration the rare advantages offered in our noble system of public schools, and the superior intelligence and culture of the people of our own State, especially, this ought not so to be. Indeed, stronger inducements are thus offered by Michigan to settlers of kindred tastes and culture, from the Eastern States, than are perhaps found in any other State or region. We should strive not only for immigration, but while so doing, our efforts should be directed, as far as possible, after the very best class of settlers to be had. A *home* immigration, so to speak, from New England and Western New York, is better for the State than a crude and unlettered foreign population, however much of an acquisition even they would be, in these days, when the necessary drafts of war are making such large inroads upon manly labor.

What then, is the one great thing to do, in order to secure these two important ends, of placing before the public the value of the unsettled portions of the State, and securing their early settlement and development?

Our reply to this inquiry is, *the immediate establishment by the State of a Land and Immigration Bureau.* The same thing has just been recommended by Gov. Yates. This, for reasons so apparent as to need no enumeration here, should be located at the point where new comers and emigrants from other lands first enter the State and begin their inquiries.

Among the first and most important duties assigned to this Bureau should be:

1st. The collection and systematic arrangement of all existing information in respect to unsold State and Government lands.

On the removal of the United States Surveyor General's Office to St. Paul, in the year 1860, all the field notes, books, plats and papers, pertaining to the land surveys in this State, were by law deposited with the State authorities at Lansing,

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where they still remain. These original maps, connected as they are with the field notes, (and of which they are transcripts,) form the basis of all the surveys of the State, from the remote days of our settlement as a Territory, and are of inestimable value in all questions of disputed boundary hereafter to arise. Aside from their value in these respects, they embrace and express all the reliable information we have as to the topography, character of soil and varieties of timber, throughout the entire State. They should, therefore, be preserved as among our very choicest possessions.

This large fund of useful information, now practically unavailable to us for want of proper collection and location, might be made, in connection with the Bureau here proposed, of the very highest value in its practical workings.

2d. There should also be at once adopted and pursued throughout the State, a rigid system in respect to the subdivision of sections, and the retracing and reëstablishment of original lines of survey; and these duties would naturally appertain and belong to this Bureau. The appointee to it should therefore be familiar with the government system of surveys, and with all the laws, rules and regulations affecting the same, so as to be able under all circumstances, to give direction and instruction to county surveyors.

The absence of all authority and instructions of this character, now controlling the action of this class of surveyors, has already been the means of much confusion, and is daily sowing the seeds of serious litigation in regard to boundaries. It is proper, however, in this connection to remark, that this state of things is not so much attributable to the surveyors themselves, as to the want of some recognized and authoritative *system*, founded upon the code of laws and rules adopted by the government, and which (being for the most part inaccessible) are possibly quite unknown to many of those entrusted with the responsible duties of this important office.

3d. This Bureau should also be clothed with all needful powers to employ and direct suitable persons, as well to examine

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and report upon lands, as to accompany settlers in their search after and choice of them. The expense of all persons so employed, would for the most part be cheerfully borne by the parties applying for lands, and the State saved from any large cost in these respects. Under the exercise of these powers, the State would soon be possessed, in a compact form, of a minute statement or report as to the great body of her lands; and being thus informed, could fix far more intelligently than at present, just and remunerative prices upon them. Thousands of dollars would in all probability thus be annually saved to the State; and possibly hundreds of thousands might so have been saved, had such a system been adopted twenty years ago.

This is particularly obligatory upon us in respect to the State's *Mineral Lands,* which have accrued to us through the operations of the swamp land grants. A single location of value might bring into the State Treasury many thousands of dollars, while a disposition of the same property without exploration, might as readily result in a return of less than a hundred dollars. This examination of mineral lands might be associated with a further geological survey of the unexplored region of the State, and all its advantages secured in this way at a comparatively small cost. But irrespective of cost, this work should be done, and these returns secured to the State at the very earliest day practicable. There can be no loss on such an investment, but on the contrary, decided and affirmative gains.

4th. Under the auspices of this department, agents might from time to time, be employed to visit Eastern States and cities, and even foreign lands, with a view to disseminate information; so that the steps of settlers may be turned hitherward in the full confidence of their obtaining here the object of their pursuit. Other special and auxiliary means to this end might be adopted from time to time, under the sanction of the Legislature, as circumstances called for their employment; and so the stream of immigration, once commenced, would continue to flow in upon us with a steady but ever increasing current.

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5th. As the productions of a State are best shown by samples of the same, there should also be committed to this department the selection, preservation and presentation to the public of the various minerals and other products found within our limits, all of which should be accompanied with appropriate statistics and suggestions to capitalists at home and abroad. In short *all* information respecting existing resources, and all recent discoveries, with every fact calculated to arrest attention, and attract the settler, could be appropriately committed to this department for compilation, and general diffusion throughout the country.

Eastern States have long since found it to their interest, to institute and maintain offices of this character; and the Western States would do well to imitate their example in this important matter. At present, the want of such a State repository, with its different specimens, and its classified information and statistics, is almost daily experienced by every business man in the State.

Still other features might be engrafted on this department, which whould suggest themselves as it took shape, and progressed in the direction prescribed for its operations; and which need not encumber its action, or enlarge to any great degree its expenses.

The simplicity of this plan of organizing and placing directly under the eye of the State, all its varied possessions, overrules at once the idea that it can only be achieved by some great expenditure of $50,000 or $100,000. The expense of obtaining and collating the *main* items of information necessary to the department, would not be large, for the reason that the greater portion of such information can now be had from the public offices, and from individuals who would be glad to furnish it, when once the Bureau was established.

Nor would the general current expense of the entire department be heavy, if a proper system of compensation should be adopted, based upon commissions for lands sold, and on fees for information furnished, or for services rendered by the depart-

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ment, to persons seeking the same for their own private purposes.

Indeed, if committed to the right hands, it might be easily made to do much more than pay its own expenses, and become ultimately a source of moderate revenue. But over and above all this, it will much more than pay all outlay upon it, in the superior benefits resulting to the State from the acquisition of settlers, and the sale of the public lands at prices corresponding to their real value. In this last particular alone, the expense of the department for years might be saved by the discovery and assessment of value upon the State's lands during the first year of its operations.

For example, the chief value of the State swamp lands (excepting those in the mineral range) consists in the pine timber upon them. No discrimination in price has yet been made between those covered with timber and such as are not thus furnished. Parties therefore who purchase at the minimum price, now enter upon these lands possessing the timber, strip them of their value by removing the same, appropriate the proceeds, and then abandon the lands, leaving them, for all purposes of subsequent settlement, without any attractions whatever. But the explorations under the directions of this Department, from time to time, would (as already intimated) discover all this class of lands, and so enable the State to increase their price upon them, or to *reserve* them—as in our opinion they should be reserved—until they were reached by settlements. They would thus be made doubly subservient to the State; first by attracting settlers into their vicinity, and secondly, by supplying them with the character of timber required for building, and at prices remunerative to the State. Thus in a short time there would flow into the treasury large sums of money which now, under the semblance of a contract with the State, are annually stolen from its resources.

Before dismissing this subject of a *land* and *immigration Bureau*, which in my opinion holds, as in a nut-shell, the kernel of any State policy in respect to our undeveloped resources,

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which we may hereafter see fit to adopt, it is proper to add that great care should be exercised in making the appointment to this department. The selection and placing over it of the *wrong man*, might not only cause the experiment to fail at the very outset, but would be very likely, (as affairs of this sort generally work,) to prevent the State from following up the plan here sketched, and without which, as it appears to me, nothing of real worth can, in this field at least, be profitably accomplished.

The essential requisites in this appointee, should be capacity and integrity. This capacity should involve a thorough knowledge of our land-history, both Federal and State; a large practical experience in the matter of examining, valueing and selling lands; superior executive abilities, and a wide acquaintance with men both in and out of the State. The position should be lifted above party level, and filled as we would fill an agency to look after like interests for ourselves. Mere place hunters, on the modern system of giving to the victors the party spoils, should, in this matter at least, be summarily set aside and refused a hearing. The stake is too great to be thrown into the cauldron of party nourishment; such a course would be almost certain to result in merely giving one more man a chance to stand at the public crib; that, and nothing more! The integrity required, should be of that character which is exacted of those whom we place in the most confidential relations with our business. In such a place as this, a *false* servant might do the State much mischief, while a true man, in the matter of opening up the State to settlement, and bringing to light her hidden resources, could do as much real public service, as the Executive and Legislative departments of the State combined.

Such a man the Executive could find, and being found, he should receive and be allowed to hold his appointment during good behavior, so that he might grow with the department over which he presided, and in and by such growth, aid and promote yet more and more, the growth of the State.

Another topic which cannot here be appropriately passed

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over, but which is more than sufficient of itself for a lecture, is the subject of manufactures.

The great variety of raw material abounding in our State, has already been referred to, and the list might be yet further enlarged had we time to do so. As it is, we can only express a thought or two on the general subject.

Never before were such favorable opportunities offered a people to originate manufactures on a grand scale, as those which are now unfolding to us. The necessities of the nation's treasury, have set at rest for generations yet to come, all questions as to the *expediency* of a prohibitory tariff. We have it, in full measure, on almost every article which we desire to work up into marketable material, so that protection may be said to be now permanently guaranteed to all American manufactures

In addition to the abundance and variety of our material, it should not be forgotten, that our central western position as a State and our peninsular form, afford us facilities of transportation east, west and south, and cheaper access to more markets for our commodities, both raw and manufactured, than those enjoyed by any one of our sister States. The iron and copper ores of Lake Superior for instance, may be brought down to the well-timbered coasts of the Lower Peninsula, and being there manufactured, can be economically dispatched westerly and southerly, by Wisconsin and Illinois, or easterly to the seaboard, and direct to Europe. Instead hereafter of being the dependents of Great Britain for her manufactured articles, she will even begin to solicit us for some of ours. Glasgow is already asking us for Lake Superior iron; and unless we unhappily drift into a warlike exchange of a heavier commodity with this ungracious kingdom, it will not be many years before the sceptre of commercial empire, through the medium mainly of our vast and valuable manufactures, shall have passed from the boastful hand of Britain, into that of the towering and invincible Republic of the West. Our iron mountains are only being now unveiled, our copper mines only beginning to take

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remunerative shape; our coal, a source of wealth, gypsum, salt, oil, (now pouring its millions into the lap of Pennsylvania,) are yet to be developed, while our woollen, cotton and ware manufactures have scarcely begun to appear.

A French gentleman and naturalist, named Trouveleau, now of Massachusetts, has recently discovered in our Cecropia and Polyphemia flies, two varieties of the silk worm, whose cocoon is four inches in length, and the fibre of whose silk is much stronger and the yield greater than those of European countries. The worms feed in the open air on oak leaves, and require very little care. From his experiments with them, quite recently made, it may be safely asserted, that silk culture on a most successful scale, is shortly to be added to the list of our native manufactures. Thus the path is opening for the nation to march forward into a total independence of foreign Governments; strengthening upon herself the imperative obligations, of what the people have long since accepted under the name of "the Monroe doctrine," and saying to foreign nations, as they anchor their navies a league from our coasts, "thus far mayest thou come, but no farther!"

But it is alleged by those interested, that capital is deterred from investing in the development of these attractive materials, in consequence of burdensome taxation under existing provisions of law—that promising enterprises have thus been fettered in their feeblest years, while some have been strangled in their very birth. It is also asserted that while Illinois discriminates in favor of capital, Michigan discriminates against it, by taxing it eight times as much as is done in the former State; and that capitalists must continue to locate their factories elsewhere than in Michigan so long as these legal prohibitions remain upon her statute book.

There is no doubt that it is for the interest of every government to encourage and cultivate manufactures. England and France cherish these interests as the very apple of the eye; discriminating by protection and appropriation, whenever and

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however it becomes right and proper so to do. Thus these two nations have largely multiplied their wealth, and fastened tight their commercial grasp upon the remaining nations of the earth.

With little or no surplus wealth to be thus invested it becomes the duty of Michigan to do what she can to bring in the wealth and labor of others, in her efforts at self development. Instead of erecting barries against their approach, all obstacles should be removed and the way cleared for their entrance into the fields of our native but dormant wealth, and if needs be a premium of privileges offered to win their presence and citizenship.

How far the operation of existing laws can be properly suspended in respect to manufacturing associations not yet paying dividends, and such as are hereafter to be organized, and how far, by special legislation, capital may be invited here to invest, are matters of appropriate, nay, even urgent consideration by our Legislature. Illinois, by her discriminating legislation, in respect to manufactures, (such, among other privileges, as exempting from taxation all machinery thus employed,) has done much to build up this important element of commercial wealth within her borders. Michigan, instead of extending like favors to the incoming capitalists, demands one per cent. on the capital of mining, and one-half of one per cent. on the capital of manufacturing corporations. Within my own knowledge, the following discrepancy accidentally revealed itself in respect to the State taxation for the last year, upon a manufacturing establishment in the city of Detroit; its capital being $100,000, the State tax under the law, was $500. But it so happened that the establishment having been but recently converted into a corporation from a business firm, the assessment had been made by the officers entrusted with this duty, upon the entire property, under the supposition that it still continued a firm, and the assessment *thus* made was only $82! a penalty of $418 paid for the privilege of being a manufacturing corporation. This same company annually pays, besides the $500

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to the State, the sum of $1,000 for city and county taxes, and $10,000 to the General Government, making an annual tax of $11,500 on a capital of $100,000. It has been heretofore asserted as sound doctrine, that any man or establishment which paid ten per cent. interest for their capital, must soon run into ruin. Manufacturing establishments whose dividends do not fairly expose them to such heavy burdens, ought to be relieved as far as practicable from this large specific tax.

We are not apt to credit manufactures and machinery, aside from the home market they yield, with the large benefits they confer upon the producer, and especially upon the agriculturist. They are to a large extent identified with each other. For example, one locomotive, in twenty-four hours, will perform as much in the way of transportation as 400 pairs of horses, with all the attendant retinue of wagons, teamsters, stables and taverns planted over the route of their travel. The difference thus saved goes to swell the profit of the agriculturist upon his produce thus borne forward to market. No State in the Union has such great natural resources and facilities for manufactures as Michigan, and none has such excluding and repelling laws to the manufacturing capitalist as those found upon our statute book.

Still, in order intelligently to legislate on this important subject, facts should be gathered and digested

It might be well, therefore, if some authoritative steps were taken in the way of a Commission of Inquiry to ascertain and collate material facts upon this whole subject, with a view particularly to elicit information on the following points:

What are the existing provisions of law on this subject, and what their practical effect on manufacturing establishments?

How do these laws compare with those on the same subject in other States, East and West, and especially in manufacturing States?

What changes in our laws, if any, are expedient?

And what further and special legislation may, in the exercise of a sound judgment, be deemed appropriate in order to attract

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capital and induce its investment in the development and manufacture of our unconverted mineral and other wealth?

This report, when made, should also present all the testimony and facts procured by the commission, so that the same might take permanent shape, as a valuable document for future reference.

In conclusion, we have only to remark that in order successfully to develop this great State, her citizens must all be animated with an open and generous fraternal sentiment towards each other. In all measures affecting the public welfare, they must unflinchingly follow the dictates of a sound and patriotic judgment, and not the mere whim, and ephemeral caprice of the selfish partizan. For if the people of each particular precinct, resolve that their influence and efforts, both in the Legislature and out of it, shall only be given and rendered for the benefit of their especial locality, we shall soon have nothing but jarring jealousies, wrangling contentions, warring restrictions, and general confusion and ill feeling on all sides.

With the bloody and legitimate fruits of this selfish spirit immediately before us and now displayed to the world on a grand scale, in what is speciously styled a State rights rebellion, we should be very careful to guard ourselves agaisnt even the apparent approval of any such narrow and destructive policy. But, while we continue our efforts for its complete and final overthrow, and for the vindication of that broad but long trampled constitutional right of intercitizenship throughout the Union, we should stand here at home, shoulder to shoulder for the common welfare of the State, and the perpetuity of the National Government.

"In union there is strength," and without its spirit as well as its letter among the people, this beloved Government, which has already cost us so much, and which, in itself, is worthy of every sacrifice, must utterly fail and perish.

Let every citizen, then, rise to the level of our new condition, and promptly assume his share of duty in the upbuilding and enrichment of the State.

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THE STATE AGRICULTURAL SOCIETY: ITS MEANS AND ENDS.

The State Fair—The Winter Session—The Agricultural Museum.

A LECTURE,

DELIVERED JANUARY 18, 1865, BEFORE THE EXECUTIVE COMMITTEE OF THE STATE AGRICULTURAL SOCIETY, IN REPRESENTATIVE HALL, AT LANSING, MICH., BY

A. S. WELCH,

Principal State Normal School.

The means which any society employs should always be adequate to the end it proposes to attain. If the end proposed be wide and comprehensive—if it includes subordinate ends which are many and various—then the means must be equal in comprehensiveness, variety and number; for it is a law as wide as the universe, that success in any enterprise depends upon the wise adaptation of the one to the other.

OBJECTS OF THE SOCIETY.

Now, the object which called the Michigan Agricultural Society into existence, is as broad in its scope as it is philanthropic in its spirit. It proposes to encourage not only the skillful tillage of the soil, but also the more perfect development of all the values that spring from the soil, whether directly in vegetable, or indirectly in animal forms. To every honest worker, in any of the numerous branches of agriculture, it seeks to extend the helping hand, stimulating him by every motive it can offer, to reach the largest possible excellence of product, with the least possible investment of labor and cash. Of every plant and animal and implement, it inquires rigidly its precise purpose, and aims so to increase its effectiveness that it may answer that purpose with the smallest waste of muscle or material. It

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would give to the roadster just that compactness of bone and muscle which will secure a speed that is most rapid and sustained; to the draft-horse, just the complement of form and weight most conducive to strength and rugged endurance; to the sheep, just the breeding and treatment which will eventuate in an annual offering of the heaviest fleece, with the finest fibre; to the dairy cow a process of assimulation so perfect and peculiar, that whatever the mouth devours the udder restores in the largest measure of the richest milk; and to the ox such a nice adjustment of form to fate, that he may bring to the block the least proportion of gristle and bone, to the largest proportion of round and surloin.

But it is also within the province of this Society not only to aid in adapting the animal forms to their ultimate uses, but likewise to help in determining what food will best subserve in quality and kind each of these various uses; what special forces are contained in the varieties of vegetable aliment, and which of these is adapted more than all others to produce some special quality of animal tissue, are problems which at best have been but partially solved. Their full solution and distinct announcement would save in our State untold sums, which now annually run to waste. The great laws of economy in feeding are left mainly to the unaided observations of the farmer himself. The consequence is, that while the fitness of certain ingredients to single results remain the same, the practice in feeding is various and capricious. Of the large number of different crops annually raised in this State for animal consumption, some are best fitted to be worked into the fibre that gives capacity for fleetness, some into the weight that produces strength, some concentrate most largely the elements that are promotive of growth, others the elements that are productive of the constituents of fat. Muscle and bone, butter and cheese, and pork and beef all lie in scattered atoms in the soil. They are gathered first by the subtle processes of growth into vegetable forms, and then changed by assimilation into animal products, and the prime question is, how to conduct the whole

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series of combinations so that the dead mould shall be transformed into the marketable commodity with the smallest waste of material. This problem must be worked out in all its details by chemical analysis carefully conducted, and by experiment. And while the former can be best carried on in the laboratories of our agricultural schools, the latter falls fairly within the field of work which this Society has proposed to itself to aid in accomplishing.

But further, if, as I have said, this Association properly extends its fostering care over all the values that spring from the soil, then every plant which is useful to man for food or fabric, is the object of a special solicitude. The whole catalogue of esculent roots, the host of cereals adapted to this latitude, and the countless variety of excellent fruits, whether new or old, come within the circle of its sympathies, and it puts forth its best endeavors to bring each of these to the fullest perfection of form and size. But the objects of this Society are not limited to the production simply of the finest examples, but they extend to all the processes by which the raw material is worked up into staples for immediate use. Our published lists of premiums offered to competitors at the State Fair includes not only the purest grain, the luscious grapes and apples, the noble cows and fleecy sheep, but wines and vinegar; butter, cheese and bread; cloths and flannels as well: thus showing that we lend support to the miller, and baker, and weaver, and in short, to every earnest worker in the useful arts, as fully and freely as to the farmer himself. Again, if it behooves this Association to expend its energies in improving the staple productions of the soil, whether in the crude or the ultimate state, then it follows that the improvement of all the implements and machines by which the soil is prepared, the seed sown, the crop harvested, cleaned, garnered, transported or ground, must also be added to the list of its avowed objects; and it is manifestly a part of its appropriate work to stimulate and quicken the inventive genius which has, of late, made such marvelous achievements in this department.

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Accordingly, there is many a successful inventor, who carries the diploma awarded by the agricultural committee, as a valued evidence of the genuineness of his invention; and it is a cause of congratulation to-night, that in the improvements of the methods by which machinery is successfully applied to the salvation of the human muscle, Michigan is no whit behind her sister States. But further, if the perfection of its products be our prime purpose, it follows again that all the fertilizers by which the soil is enriched and rendered prolific, may properly receive a share of attention. How mineral and animal manures should be composted, prepared, preserved and applied, are questions of vital moment to farm economy. Every growth of whatever crop is a constant drain requiring a replenishment as constant. Continue to drain while you fail to replenish, and permanent exhaustion will surely follow. Some of the older States, with their thousands of acres impoverished by a system of cropping that returns nothing to the soil, rendered as barren and irreclaimable as a desert, are striking examples of a great public calamity which Michigan will be wise to shun.

If successful agriculture lies at the basis of national prosperity, if the wants of an increasing population must be met by a productiveness increasing in similar ratio, then the fertility of every cultivated farm should be augmented year by year, until the soil reaches the topmost limit of its producing capacity; a result that never can be reached so long as nature's restoratives are given over to be dissipated by the winds, the sunshine, and the rains. It surely cannot be foreign to our mission to give our moiety of influence in settling a system of judicious economy on so vital a point, and thus aiding to avert a public misfortune—a misfortune which, if general and widespread, is the sure precursor of national ruin. Again, it is manifestly in harmony with our organization, the constituted guardian of the soil, to gather, in a place convenient for public inspection, all those products whose form and permanence render them available for preservation; to collect, classify, and exhibit all those geological specimens which indicate the mine-

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ral constituents of the soil in the locality where they are found, and to arrange and publish the resources of this State, as an agricultural region, especially the richness of our uncultivated lands, and thus to arrest and divert hither the tide of emigration that annually sweeps by us to people the less favored regions of the far west.

It is ours to give the warm welcome to the new settler by whose energies the waving grain will replace the leveled forest. It is ours to cheer the farmer in every department of his various toil, to stimulate his efforts after genuine results, to furnish models of excellence which he may strive to realize, to reward his successes and publish them to the world, to offer him better tools and better processes for bungling ones, to teach him how best to destroy those natural enemies which infest his grains and fruits, to give him easy access to all superior methods which science or experience has furnished, to arouse his ambition and enlarge his knowledge of agriculture, whether by objects addressed to the eye or by essays addressed to the judgment.

All these are, as seems to me, included in the comprehensive sphere which our orgaization was destined to fill; for less than these would not satisfy the aspirations or realize the ideal of an association originated for the advancement of a great branch of industry, on which so much of human welfare depends. All these objects are consistent with each other; they are all attainable, and their attainment is indispensable to any real progress in the science and practice of agriculture: and, gentlemen of the committee, we shall compass these benign and worthy objects, not only by looking to the farmer's wants in the present, but providing for his future needs; not only by offering stimulants to the production of single specimens of excellence, but by diffusing, as far as possible, that knowledge and skill which shall supersede the necessity of temporary stimulants, and make anything else than the permanent production of excellent results impossible; not only by aiding to improve the quality of the work, but by aiming to elevate the

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condition of the worker; and all these objects are to be sought, not as ultimate ends alone; not that the finest farms, the fleetest horses, and most symmetrical short-horns may be produced and exhibited, (though these are worthy results;) not that this, that, or the other exhibitor should take our premiums or diplomas, but as all including and tending to secure the one nobler end, namely: that the million within the borders of our State may be warmed and sheltered, clothed and fed, with the smallest wear and tear of human muscle and human life.

I do not aver that we have not seemingly had, at times, a nebulous perception of the relative importance of some of the objects I have named, and a clear perception of the value of the rest. I do not deny that we have sometimes, seemingly, ignored and selected some branches not at present so pressing, to concentrate our energies upon others more immediately urgent. What I affirm is, that all these parts form the one great whole, which constitutes the enterprise we propose to forward. Most assuredly we are not a sporting club for the trial of speed in horses; we are not an association for the breeding and improvement of devons and durhams; we are not an association of grape growers; we are not a pomological or horticultural society; not a combination for the raising of sorghum and the production of syrup; we are all of these together, and much more; we are not coördinate with any one of them; their purposes are specific, ours generic; we overlap and comprehend them all.

Having glanced thus briefly at the ends which it is the province and purpose of this Association to compass, let us next give earnest heed to the means which we either now employ or may properly employ hereafter.

These means are substantially three in number

First in the order of time, and foremost for immediate effect is the State Fair, at which thousands of our citizens annually assemble, to study the finest samples of all that the State produces, and hundreds of exhibitors gather to compete for the premiums we offer for the best specimens of all the animal,

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vegetable and artistic products. Both the visitors and the exhibitors are greatly profited, and an impetus to agriculture is given and felt throughout the State.

The second means is the annual public meeting in winter, at which papers and addresses, by prominent agriculturists, on improved processes and methods in farming are read and afterwards published. To these may be added other printed matter, such as occasional prize essays on topics requiring special elucidation, and pamphlets of instruction, similar to the one issued by the committee last year on points of excellence in cattle. The first of these meetings, held at Ypsilanti last season, was a most gratifying success.

The third means is the proposed Agricultural Museum, wherein are to be collected all those more perfect specimens and illustrations in agriculture, which can be successfully classified, arranged, and held on exhibition throughout the year.

Undoubtedly these three institutions do not include all the means which the Society might profitably employ. But they present, in themselves, a kind of completeness which is pleasant to contemplate. They constitute a series of agencies, each of which aids the efficiency and remedies the defects of the others. They are counterparts each to the others, and form, together, a symmetrical and harmonious system; a system that would produce not only immediate, but permanent and lasting results; a system that would furnish to the masses not only wholesome recreation and amusement, but food for instruction and reflection as well; that would appeal not simply to a just pride and a proper emulation, but to intellect and judgment also; a system that would incite the farmer not merely to the production of excellence in special things, for a special occasion, but to the habit of attaining to excellence in all things and for all occasions; a system, in short, that reaches and stimulates the farmer at once, and then offers to him and his children the means of a constant and perpetual progress.

But these are general statements which need a more particular analysis and amplification. Let us, then, scrutinize closely

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the merits and demerits of these three means, and determine precisely which of the ends proposed, it is calculated to subserve.

A fair and a museum have some characteristics in common, which it is well to notice. Each consists of a collection of interesting objects, selected and displayed as the most perfect specimens of the classes which they represent and illustrate.

A fair is a temporary museum—a museum a permanent fair. A fair is composed of a wider variety of attractive articles, simultaneously gathered, whose bulk and value, in many instances, make their transportation expensive, and their retention impossible; and hence they are on exhibition for a limited period. The one is an assemblage of samples, more miscellaneous and less perfectly classified; the other a collection of specimens completely classified on a scientific basis. Both present their objects to the eye and seek to gratify a laudable curiosity; the one, in order to amuse, inform, and excite competition; the other, to instruct and educate. It will be seen, therefore, that while both accomplish results that are kindred in many respects, the one is more favorable to salutary recreation, the other to serious study.

STATE FAIR.

The State Fair, being the effective agency for quick results, has very properly, here as elsewhere, been first in the order of time. It has been held annually for sixteen years. From first to last, it has been conducted by self-sacrificing men, who counted their services and time as fully requited by its success and salutary influence upon the agriculture of the State. It has been under a succession of Presidents, whose administration of its affairs has evinced rare earnestness and executive skill. It has attracted a yearly gathering of from ten to twenty thousand visitors, and paid out $40,000 in premiums alone. It has given a marked and rapid impulse to the development of the resources of the State in the shape of more remunerative crops, labor-saving implements, and valuable stock. Under its

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transforming influence, the grafted fruits have everywhere supplanted the crabbed offerings of the natural tree; the scythe, the cradle, and the flail have well nigh disappeared, and sinews of iron and steel do the drudgery once done by the human arm; the horse has gained a better breeding, and greater vigor and endurance; the sheep, once thinly and coarsely clad, has exchanged its worthless toggery for a fleece unrivaled in beauty, weight and fineness; and the native cow, with her pinched vitals and gothic ribs, is fast giving place to the symmetrical Devon and the magnificent Shorthorn.

Such are the results which the State Fair has accomplished; but great and valuable as they are, they do not include all the ends which we have enumerated as properly within the province of this Association. The State Fair aims to excite emulation, and appeals to pride and profit, motives which are easily reached, but which do not comprise all the incentives to human effort, nor the only available ones. The very rapidity with which it attains its objects, suggests a doubt as to their stability and permanence. Its success depends on excitement, and excitements do not survive the discontinuance of their causes. Should any unforeseen obstacle intermit the annual holding of the State Fair, it may be questioned, in the absence of other incitements, whether very many would not relapse into the indifference and torpor which are the besetting sins of the farmer's life.

The State Fair stirs up ambition and excites immediate interest, but needs, as seems to me, other helps to perpetuate that interest, by making it more discriminating and intelligent. It presents samples of the finest results in farming, and thus furnishes the visitor an ideal which he may strive to realize, but from its very nature, it can give him no instruction as to the processes and methods by which these results have been produced; consequently, in his endeavors to attain similar excellence, he must grope in the darkness of experiment, unless he gains the requisite information as to the *quo modo*, from other sources. I may admire a blooded horse, groomed and

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caparisoned for the annual exhibition, and my admiration may induce me, at high cost, to barter my sorry nag for the noble gelding; but my blooded horse will soon subside into a nag that shall be sorrier still, if I am ignorant of the proper manner in which such an animal should be fed and treated. Admiration for a beautiful product is a good thing, but an attempt at its production or possession without a commensurate knowledge, is a hazardous experiment.

This unavoidable defect in the State Fair, needs a compensation somewhere, and it is true that it may be derived from several sources, the periodicals or the Agricultural College, for instance, but we hope it may be found also, partly at least, in the line upon line and precept upon precept, given in the published proceedings of our winter session.

Again, an agricultural fair, though it stirs up zeal and stimulates effort, fails inevitably to give *precise notions* even of the objects which it presents to the eye. Precise notions can be gained only by deliberate and protracted examination of single objects to the exclusion of all others. Amid the din of the crowd and the vast variety of forms that attract the eye, it is impossible even for the most disciplined attention, to concentrate on a single one long enough to enable the memory to reproduce it faithfully. It is true that, in rare instances, an amateur may scrutinize minutely some one article, which has for him a higher interest than all the others together, but such amateurs hold a very slight comparison in number, with the multitude that are to be benefitted by the exhibition. No doubt the advantages from our yearly exhibition are many and great, but they do not consist in the acquisition of clear ideas. We carry from our annual fair a quickened zeal, gratified curiosity, a sturdier courage, renewed friendships, more active sympathies, and a deepened impression that the farmer's life is the truest life that man can live, but we carry also a confusion of intellectual images not generally available as data for judgment or reasoning. The time is too short, the throng too restless, the objects too numerous and distracting for such a result. And

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this second defect, which is inseparable from a State fair, will, we believe, find a remedy more or less complete, in the agricultural museum, where the specimens are arranged for minute inspection, where the company are more constant but fewer in number, and where the time devoted to examination is limited only by the inclination and convenience of the visitor.

Another influence which operates as a drawback to the many genuine results reached through the State Fair, is the tendency to encourage an abnormal rather than a normal development. Of all the qualities in specimens displayed at public exhibitions, that of *size* is the most striking and impressive. Only the most cultivated eye is able to resist the effect of huge and unusual proportions. The viewing committee, magnetized by this influence, not unfrequently pronounce that of all the articles placed in competition, the biggest is the best. The consequence is, an anxious production of a rank overgrowth which is utterly at variance with that compactness and fineness of fibre and delicacy of flavor which, combined with the proper dimensions, constitute genuine excellence. Grossness of growth and coarseness of texture are inseparable concomitants. Of two potatoes, the one whose size is astonishing, has attained its surface development at the cost of a cavity within, and sogginess to boot, while the other, with the smooth and clean skin, the round and moderate growth, is dry, mealy, and delicious. Of the same varieties of fruits and roots, it not rarely happens that the larger are for admiration, the smaller for eating.

From a similar influence in the stock department, an effort is constantly made to improve the outside appearance at the expense of a proper internal condition. As the annual occasion approaches, even milch cows and working cattle are often made to lay on a quantity of superfluous fat, which fits them for the show, but unfits them for their peculiar uses. Some specimens of beeves displayed at our stalls had attained so unique a condition as to induce the suspicion—and the hope indeed—that there is one quality of beef for the market and

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another for the Fair. A single example from a neighboring State, was a striking instance of the point in question. Its muscles were enveloped in huge layers of fat, gathering here and there into wen-like excrescences, unhealthy enough to spoil the digestion of an Esquimaux. Yet this monstrosity of grease took the premium over another whose tumors were less protuberant. I confess to an impression which is in full sympathy with one who complains "That the societies for agricultural encouragement persist in giving premiums to (so-called) fat cattle, mere monsters, not of good, wholesome, muscular fibre, well mottled, but mountains of adipose substance, which no christian can eat, and which are only disposed of profitably by serving as an advertisement to some venturesome landlord from whose table the reeking fat goes to the soap-pot."*

The truth is, that in every organized substance, whether vegtable or animal, it is the harmonious development of all its natural qualities that constitutes its perfection, and as size is one of these, it follows that it can be enlarged only in a just ratio to the improvement of all the rest.

I am glad to say that this tendency to overrate the value of mere bulk, marked as it is in particular cases, is, after all, exceptional, and so may be looked upon as a departure from the general practice in awarding premiums at the State Fair. Such awards are, beyond question, generally just, and the few that are not so under the influence of the above mentioned prejudice, are, at any rate, in harmony with public opinion. The tendeney I have referred to, will disappear before the progress of a more discriminating taste and judgment, counteracted, as it will be, by the influence of the Museum, whose collections, to some extent identical in kind with those of the Fair, will be more slowly, and therefore more deliberately and carefully made.

Another lack in the completeness of the many positive benefits conferred by the State Fair, lies in the methods of preparing particular products for exhibition—a defect which is closely

*Donald Mitchell.

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related to the one we have just considered. It may be fairly doubted whether, in some cases, the special policy pursued in fitting commodities for the Fair, will serve as an example which may be profitably followed in general practice on the farm.

The question fully stated is, whether the thing exhibited fairly represents the general results reached by the exhibitor, in the production of the entire class to which it belongs, or whether it has been evolved from stimulating processes outside of his ordinary practice, and too expensive for general adoption. In the former case, the article, if excellent, is of great value for the end to be gained by the exhibition; in the latter case, whatever be its qualities, it is worthless except for the purpose of empty show. Of course any product, however remarkable in form or beauty, is valueless as a sample, which has been, and must be produced at an outlay which its marketable value can never refund. Thus a Canadian showed, with great complacency, at his county fair, a monster carrot, and unwittingly killed the interest it excited, by revealing the significant fact, that it had sprung from a chance seed on the sunny side of his barnyard, and had been hoed and watered assiduously throughout the season; while his staple crop was less than the ordinary yield. My pleasure in dwelling upon the rounded form and magnificent size of a yearling heifer, was once greatly disturbed, on my being told by the owner, in a burst of confidence, that up to the very time of the exhibition it had daily exhausted the udders of a brace of cows, and that it was the most expeditious milker on the farm. I like magnificent yearlings, but I have an internal habitual respect for butter and cheese as well. The question is, can I raise such carrots and calves, by a similar investment of care and cash, consistently with any known principle of agricultural economy. Nothing is clearer than that we can never exhibit collections of purely representative objects, so long as the farmer raises, by different processes one kind of product to show, and another to sell.

I have ventured thus freely to glance at these unavoidable

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defects for the purpose of showing that, however complete its success in some directions, the Fair cannot be expected to subserve all the ends, which it is the duty and destiny of this Society to reach, and therefore, that it needs compensating helps, such as similar bodies in the elder States have adopted, to enable them to accomplish fully their allotted work.

THE WINTER SESSION.

I have now a word to offer in respect to the kind of help to be derived from the judicious management of our winter sessions, and then I will endeavor, with your indulgence, to examine, with some minuteness, the nature of an agricultural museum, and to show what portion of our enterprise it will be calculated to further. In the first place, the exercises of our winter session, if wisely conducted, constitute one of the agencies which will increase the efficiency and remedy the defects of the Fair. So far as they go, they will tend to satisfy the aspirations for knowledge which the fair excites, and furnish the information which it makes necessary, and yet withholds. The winter session is designed to teach precisely what the Fair does not. The latter presents to the eye the bare results of agricultural labor; the former should present to the judgment the processes by which these results have been obtained. It will elucidate and offer, for general adoption, those modes of procedure on the farm which will produce the paying article, and expose, for general rejection, those that will not, whatever be their attractions in other respects. By showing that kind of economic labor which will secure results that combine both the elements of beauty and profit, it will tend to reduce to a negative quantity a species of idle amusement known as fancy farming.

Thus will our winter meeting be made to counteract some of those agricultural abuses and abnormal developments of product, which the State Fair, as we have shown, not only cannot correct, but is even liable, unwittingly, to encourage. But in order to make it subserve these desirable ends, it is essential to observe, in its management, the following conditions:

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1. That of the numerous topics needing discussion, those should be selected which embrace methods practically the most important, and at the same time the least known;

2. That these methods shall have been tested by actual practice, and found to be suitable to the soil, climate and other conditions of farming in this State;

3. That men be invited to present papers on these methods, who have proved their value, by successful trial, and can give the emphatic utterances of actual experience;

4. That the questions selected for discussion, involve a statistical statement of the processes by which the more striking results presented at the State Fair have been produced;

In this way we shall make the winter session and the Fair effective auxilliaries, each indispensable to the other, the one completing, in a measure, what the other successfully begins. In this way, too, we shall find the winter session, in itself, an unfailing source of valuable information to the farmers of Michigan. The marked success of the initiatory meeting, last season, was an augury most encouraging for the future.

Of course, I am aware that in this branch of our enterprise, we have many efficient allies. Among them may be reckoned the agricultural periodicals, the State Board of Agriculture, and the State Agricultural College under their charge. The value of most of the periodicals, being issued at the east, is lessened by the fact that many of their articles are of doubtful application to the varying conditions of the west. The Secretary of the Board of Agriculture, a gentleman widely known for his attainments in all matters relating to practical farming, is constantly engaged in labors kindred to our own, and the Agricultural College has inaugurated a series of published experiments, which give great promise of usefulness. These energetic co-workers will stimulate us to still greater endeavors; for it may be said, without irreverence, that as in the moral, so in the agricultural field, the harvest truly is great, but the laborers are few.

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THE AGRICULTURAL MUSEUM.

Let us now concentrate our attention upon the nature and purpose of the third instrumentality to be employed by this Society, namely, the Agricultural Museum. This project, though properly last in the order of time, is by no means last in the order of importance. For, though slower in action than the other two, it will be far more enduring in effect; for its prominent purpose is to impart a precise and definite knowledge of the products and resources of this State in agriculture and its kindred arts, and to give facilities for the acquisition of such knowledge, not only to the present but to coming generations as well. To what more noble purpose can this Society devote a portion of its energies and surplus funds, than to the furtherance of a project which shall furnish for every earnest observer, a means of gaining those accurate notions which lie at the basis of all genuine progress? How can we better help the farmer than by giving to him and his children, access to the means of a most familiar acquaintance with the material on which he works? How can we better aid in developing the agricultural resources of the State, than by gathering an exhaustive collection of samples, which, when classified and arranged, shall present these resources with infallible accuracy as to their kind, quality and value?

At a loss of time and money, I may travel to Saginaw to inspect the salt it produces, or to Plymouth to test the quality of marl found on lands adjacent, or to any orchard to explore for examples of the ravages which the borer has made, or to this, that, or the other farmer, to secure some one of the varieties of choicer seeds; but if all these things were collected and arranged in a single locality, convenient for access and study, then, certainly, I and a multitude of others would be apt to avail ourselves of such an opportunity to accomplish the same object, at the saving of so much time, trouble and expense. But how much greater the advantages which such a collection affords, if each of its specimens is so clsssified and

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labelled as to indicate with precision its origin and qualities. If, as our Constitution declares, it be our object to promote the progress of agriculture and its kindred arts, where in the widest scheme for accomplishing this, both for the present and the future, can we find means more fitting and effective?

But a conviction of the benefits which would accrue to agriculture from one or more museums, situated at accessible points in the State, needs no prolonged statement of reasons so obvious. Even in the absence of all experience of its operation and effect, there is a strong presumption in its favor. Many of the similar societies in the older States have found it an invaluable adjunct to their other means of advancing the interests of agriculture. The Board of Agriculture of Massachusetts, for example, a body organized for a purpose similar to our own, has its agricultural cabinet, in which, among other matters of high scientific interest, is a complete collection of insects injurious to vegetation; and by legislative authority, its Secretary, Charles L. Flint, has edited and published, at small cost to the reader, a beautiful edition of Harris's work, which gives full description of these insects, together with their habits, metamorphoses, mode of propagation, and how they are most easily exterminated.

The New York Agricultural Society has always regarded its museum as one of its most prominent instruments of success, in the furtherance of its objects. Col. Johnson, the Secretary, writes me that it is held in the highest estimation.

A brief extract from a notice of its contents, by the New York Tribune, four years ago, will serve to show something of the character of this interesting collection:

"The Museum room is about 67 feet long by 37 wide, and has two galleries, supported by light iron columns. The room is lighted by side windows as well as by two enormous skylights in the roof, and is as well adapted to the purposes for which it was built as any we have ever seen. The stairways are of iron, and a neat iron railing runs around each gallery.

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Against the walls are glass cases, those on the main floor being appropriated to miscellaneous articles, such as costumes and fabrics of foreign nations, antiquities and relicis of this country, and curiosities in the way of sports of nature, old spinning wheels, looms, minerals, and other matters of interest. The cases on the second floor are filled with a most complete set of specimens of the grains and seeds of our own and various foreign countries, which in itself is a study of a most interesting nature. The seeds of America coming first in order, we see here scores of varieties of Indian corn, many of wheat, rye, oats, and other cereals; and a very complete assortment of all the common and uncommon garden vegetables. England, Hungary, Bavaria, Austria, France proper, African Colony of Algeria, are all represented by numerous specimens. The resources of almost every European and some Asiatic countries, are more or less completely illustrated in these cases, and it is a curious study for the farmer to notice how closely grains from widely separated countries resemble each other.

"The cases along one entire side of the third floor are appropriated to Dr. Asa Fitch's entomological collections, which already are superior to any others in the world in many respects. Time will be when the zealous student of Natural History will be able to study the nature and habits of our noxious and other insects more satisfactorily on this third floor of the State Society's Museum than he could any where else, and time will also be when our farmers will awake to the fact that one of their greatest benefactors has lived out his quiet life, and perhaps laid him down to die in an obscure rural district, with no monument to keep green his memory, except these splendid collections which he freely gave years of his life to gather from our fields and forests.

"The Fitch collections, when arranged this fall, will be divided so that the various insects in all their stages—egg, larva, pupa and moth—will be placed in drawers beneath the cases, while the more roomy space of the latter will be devoted to the display of specimens which illustrate the ravages of the insects.

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There are now but few specimens set up in the cases, but quite enough to show the ultimate value of the collection. Thus we have a piece of basswood, the substance of which has been mined out by white ants. Alongside it is a glass-covered box which contains specimens of our dread foe, the wheat midge, its larva, a male fly, and kernels of wheat shrunken and ruined. Another of these little boxes shows us the Hessian fly, its larva, its flax-seed-like eggs, and a wheat straw broken open to show the "flax seeds" within. Here we have a twig of mountain-ash covered with scale insects; here, on a twig of poplar, the eggs of the "executioner tree bug," strung along in two unbroken parallel and contiguous lines, like a string of sandal-wood beads or a daintily-braided strand of maiden's hair; here we have a limb of black oak cut off by the oak-pruner; here a piece of red cedar—which every one has believed insect proof—utterly destroyed by the stump wasp; while, like the mysterious foot prints in the red sand-stone and chalk, on the bit of pine bark are to be seen the finger-like tracks of the "pine bark-beetle," starting from one central pit or hole, and spreading—always four at one side and two at the other—like the fingers of a hand. In a bottle of spirits, here we have the larva of the "hickory moth," the largest known, which is so frightfully ugly—what with its long horns, and bamboo-like joints—that we cannot blame the plantation darkies for calling it the "horned devil." Here is a hickory ax-helve, sound as a nut when first made, but since then completely riddled at one end by some hickory beetle, probably (says the label) by the *Apate basillaris*—which of course will be perfectly intelligible to every one of our readers. In this case, near the stairway, we see a great section of applewood—five feet seven in circumference, one foot ten in diameter—which has been literally honeycombed by the borer. Not to occupy space with further enumeration, we will merely say that by this time next year, farmers passing through Albany will be able to examine, in this collection, several thousand specimens of insects and their ravages.

"On the ground floor are arranged numerous American farm

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implements which have from time to time been donated to the Society. The foreign visitor can here see many of our best variety of reapers and mowers, drills, harrows, cultivators, fan-mills, and a large collection of plows not only of the latest improved patterns, but, what is especially valuable for comparison, those clumsy contrivances of wood with which our grandfathers pried apart their stubborn furrows. Among the best of the modern plows is the "center-draft," of Prouty & Mears, which was honored at the London World's Fair with a first premium. If ever an award was honestly earned from reluctant judges, we esteem that this one was; and however public opinion may be divided in the Henan-Sayers case, it must be fairly conceded that our English friends did the fair thing for American plows —when they were forced to do it. At the trial in question, Colonel Johnson heard the English laborers discussing the merits of the Yankee plows in uncomplimentary terms. They had decided that the flimsy things would break, or at any rate that they would not run in. This latter seemed the opinion of the plowman who was ordered to guide the Prouty & Mears plow, for he persistently bore upon the handle with his whole weight in the benevolent intention of forcing the nose to enter to the requisite depth until he was ordered by the Colonel to let it do its work as intended. The man turned two furrows around his 'land,' and then admitted in a loud 'aside' to some of his anxious friends, 'that ere dom'd thing would 'a held itself if oi'd a let it.'

"Not one of the least valuable things in the Society's cases is a pair of long-handled 'thistle tongs,' for eradicating thistles from pastures more effectually, and certainly pleasantly, than if the unprotected hand were used for the purpose.

"A large assortment of agricultural and horticultural tools from India, all of which have been in actual use, have been recently presented to the Society, by L. H. Morgan, of Rochester. Thus the farm tools of the time of Jacob and Laban, are placed alongside those in common use among our New York farmers to-day; and while in the main we are thus led to see the march

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of improvement which through the long centuries has been made, we cannot fail to be surprised at finding in this lot of rude tools, some contrivances for which patents have been granted at Washington, within a few years. For instance, there is a pump made with a series of buckets on an endless rope, which, to all intents, is the same as the chain pump which we think such a remarkably clever Yankee invention; and in two of the grain and seed drills, the seed is dropped through tubes whichpass through a shoe, the furrow is cleared for it, the seed is covered, and compactly embedded, exactly as our seed is now planted and covered by a score of 'modern improvements' which are to be found at any of our large Fairs.

"The Hindoo cultivator is, to our notion, a more philosophical tool in principle, than our modern harrow; for, whereas the latter compresses the soil over which its wedge shape teeth travel, the barbarian's cultivator, while it loosens, lifts the earth, and thus leaves it in as porous a state as previously. There is a great plow in this lot of tools, meant for a team of twevle bullocks, which will plow, or rather root, to a depth of some eight inches, and which embraces that principle of the double arch, which Professor Mapes counts as the great merit of his 'soil lifter.' True, the sole of this Hindoo plow is of wood, and not less than five feet in length, and only its nose is shod with iron, but from nose to beam, and from center to sides of the sole, there is a definite although gradual arch, which is well calculated to lift the soil and throw it outward from the center.

"We should be very loth to conclude our imperfect sketch, without some complimentary notice of a beautiful suite of specimens of dried grasses and flowers, made by a farmers wife, in Rensselaer county. By some peculiar processes of dessication, she preserves all the colors of the flowers in their original brilliancy, as well as retaining their shape. A large bouquet, and many single cards of flowers, which had been in the cases for a twelvemonth, were apparently as fresh in color, as on the day when they were picked. Another lady amateur botanist con-

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tributes a collection of 154 varieties of weeds, all of them collected, pressed, and correctly named, by herself. And so, from case to case, and gallery to gallery, we might wander, and find a host of things of more or less interest to our readers, but we trust we have said enough to convince our farmers that a day spent in the Museum, at Albany, cannot fail to prove, in a high degree, profitable."

Of course, museum collections will vary with the resources and necessities of the particular States in which they are made. The fundamental purpose of our own should be, as seems to me, to make a full exhibit of all the productions of Michigan which are limited to a certain bulk, and to include complete sets of specimens illustrating all the values that lie in and beneath her soil. In the first place, it ought to embrace exhaustive samples of those geological strata which indicate the qualities and mineral constituents of the soil in the region where they are found. It ought, also, to contain complete examples of the minerals and ores which have already proved such a prolific source of wealth to the State. It should comprise, moreover, illustrations of commodities for household consumption, of subterraneous origin, in different localities, such as the coals, and various qualities of salt manufactured so successfully at Saginaw; and also select specimens of all the mineral fertilizers, as limestone, marl, plaster and the like, of whose abundance we have already so large a promise.

Of all these, many may be easily gathered from the places that supply them, and the rest may be obtained, it is hoped, by an arrangement with the gentlemen who have had in hand the scientific survey of the State, which was begun several years ago, and which it is hard to believe the Legislature will abandon before it has been completed.

The Museum should be likewise a depository for the more excellent of the machines and farm implements, which have been tried and approved by actual practice, together with a collection of similar articles, from the most bungling to the

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best, whose purpose shall be to display to the eye the progress of art in this particular. In addition to these, all the latest inventions, which are useful in prospect but as yet untried, will naturally find place in this division. Implements, of whatever sort, too large for the room assigned them, could be represented by smaller models prepared for the purpose. This department could be easily filled by voluntary contributions from various manufacturers and by inducing the exhibitors at the State Fair to give still greater publicity to the premium articles, by a further exhibition at the Museum, indefinitely continued.

Another portion of the Museum should consist of sample varieties of wood, indigenous to Michigan. These samples might be cut into the likeness of volumes, of uniform size, neatly finished, labeled on the back, and put up in library style. Such a library I once found in the interesting collection of the Agricultural Academy at Hohenheim, in the kingdom of Wurtemberg. It presented, arranged upon shelves, a great number of wooden tomes, whose titles indicated the different species of valuable timber in which the forests of Germany abound. Each tome, when examined, was found to open in the centre, revealing a cavity within, which contained, glued to its sides, the preserved leaf, flower and fruit of the tree of whose wood the tome was a sample, together with a short essay, in script, on its qualities, cultivation and uses. These ligneous books, whose leaves displayed no printed sentence, furnished, from their very covers, a deal of information on a topic of no little importance. A collection of this kind is the more desirable, because the time is coming, nay, has already come, when the wealth of our forests should no longer be carelessly squandered; when a system of economy should be urged, in the preservation and judicious use of the valuable fuel and lumber, now doomed, in many instances, to thoughtless and thriftless destruction.

Again, the Museum must be made a depot for seeds, which shall be perfectly ripe, pure and healthy. No part of the en-

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terprise can be of greater moment to good husbandry than this. Throughout the wide domain of organized nature, it is an immutable law, that under favorable conditions, like produces like, even in the minutest particulars. Principles better known and applied in the breeding of domestic animals, probably operate with equal precision, in the reproduction of varieties in the vegetable kingdom. Hence, the saving and planting of seeds which are plump and perfect, are of vital consequence to the coming crop. "The development of a plant," says Leibig, "depends upon its first radication, and the choice of proper seeds is, therefore, of the highest importance to the future plant. Poor and sickly seeds will produce stunted plants, which again, will yield seeds bearing in a great measure, the same character."

If this be true, he who, by new combinations, produces an improved variety, is a public benefactor; and he who secures its wide distribution, earns a similar title. This Society may properly participate in so benevolent a work, by opening, it may be, an office in its Museum, for gathering and furnishing widely to others, reliable or improved seeds for the grain crops, or grasses, or esculent roots.

A feature of not inferior interest would be found in carefully arranged specimens of wools from the flocks of our successful wool-growers, specimens which should demonstrate the effect of breeding upon the fineness and compactness of the fleece, and no less attractive to the stock raisers in general, would be the numerous engravings donated by the owners of sheep, cattle or horses, which have become known to fame by combining in a superior degree, all the excellent qualities which spring from purity of pedigree.

Another department likely to excite the enthusiasm of visitors, would consist of artificial models of all the finer varieties of Michigan apples and pears, prepared by an inexpensive process lately invented, and so accurately finished and painted as to be undistinguishable by the eye from the natural fruit. Specimens for models might be obtained, to some extent, from

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the best samples shown at the State Fair, and by gratuitous contributions from other sources. No part of the collection would combine so strikingly the beautiful and the useful as this.

But the limited space allotted to a lecture warns me to forbear a complete enumeration of the classes of things which would properly find place in an agricultural cabinet. I will only add that our Museum ought to embrace prepared and preserved specimens of all the smaller animals, which in this latitude are harmful or helpful to the farmer. There is an urgent necessity for a general onslaught to be made upon those innumerable pests that, season after season, make such alarming havoc with our crops of fruit and grain. There is a necessity as urgent that all the quadrupeds and birds which are naturally destructive to these noxious feeders, should be carefully multiplied.

With every returning summer comes the resurrection of the swarms of borers, curculios, weevils, worms, and the like, which combine, in countless hosts, to rob the farmer of the earnings of his toil. Particular families of these have of late generated with such marvelous rapidity as to beget a well-grounded fear that their numbers will result in the utter destruction of the crops on which they feed. In some quarters this fear is already realized. The locust, once valued for its enduring wood and grateful shade, has yielded to millions of perforations, which have well nigh reduced its limbs and trunk to dust. The plum tree, which once offered its sure fruits, round, ripe and melting, now casts them annually to the ground, blighted and worthless. In all manner of vegetable delicacies the worm is demanding to be served first. The time may come when no man can taste an apple whose skin, unflecked and unstung, shall forbid the apprehension that the first incision of the teeth will reveal a slimy occupant. The time has already come when, to indulge in the luxury of green peas, is to devour a host of unsavory grubs, which are the progeny of a prolific weevil. These various destroyers, threatening such wide-spread evils, demand the

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wisest and most vigorous measures for their extermination. Such measures can be founded only on an accurate knowledge of their form, habits, metamorphoses and modes of propagation, and more can be learned from a glance at these in their different states than from an hour's application to the unaided descriptions of a book.

But if the Museum should present his enemies to the farmer's eye, it should likewise present his friends, the insectivorous birds—should present them in such guise, that he should be made to appreciate the value of their friendship—that he should perceive, indeed, that he who wantonly shoots a single wood-pecker, gives life to thousands of injurious insects that propagate in more than geometrical ratio.

I have thus, gentlemen of the Committee, endeavored to gather within the compass of an hour, the prominent characteristics of the three agencies which we may fitly use, in the furtherance of our allotted enterprise. I attempted first, to sketch the nature of this enterprise, to show how broad and how benign it is, and how worthy to call forth all the energies of this Association. I have taken a rapid survey of the merits and defects of the State Fair, showing that the former are great and striking, but not lasting in their effect, and that the latter need to be remedied by counteracting influences outside of itself. I have shown that one of these is the winter meeting, and that its success depends on conditions that are easily realized. I have shown that the other is the Agricultural Museum; that in itself, it is an object deserving our heartiest interest; that it is a scheme appropriate to the known purposes of this Society; that it is essential to the development of our agricultural resources; that its material may be found within the State; that it is no untried experiment, having been tested and approved by societies older than ours, and that in itself, it will be the sure instrument of great and lasting good.

These views embody my honest convictions set forth after much reflection, and you are to pronounce whether they be genuine or no.

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I will only add in hasty conclusion, that the proposal for a Museum was made by one under whose administration the Society reached its highest prosperity; one who has left a reputation for great business integrity and tact; one who had broad views and quick sympathies with every effort to promote the public good, and if this project, which he cherished to the last, be unwise or hasty, it will stand in solitary contrast with all the other purposes of his active and useful life.

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LECTURE

ON THE

SOILS AND SUBSOILS OF MICHIGAN,

BY

PROF. A. WINCHELL,

Of the State University, Ann Arbor, Michigan

ANALYSIS.

I. The Connection of Human Condition and Progress with the Soil. Illustrations to show how national and individual character are determined by the soil.

II. The General Geology of Soils.
1. The basis of all soils and subsoils is disintegrated rocks.
2. Soils have existed at other periods of the world's history.
3. Drift agencies.

III. The Different Varieties of Soils in Michigan.
1. Sketch of the geology of the Lower Peninsula, with an account of the soils derived from the various formations.
2. Physical characters of these soils.
3. Agricultural and sanitary properties of the three principal varieties of soils.
4. Peaty soils—their origin and properties.
5. Upland prairies—their origin and characteristics.
6. Sand dunes—their origin and effects.

IV. Influence of Human Agencies upon the Soil.
1. The destruction of the forests.
2. The drainage of swamps and lakes.
3. The creation and fixation of dunes.

V. The Excellence of the Soils of Michigan.
1. What they are capable of producing.
2. Reflex influence upon the population of the State.
3. Necessity of making greater efforts to develop our resources and disseminate information.

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GENTLEMEN: Man is the foster-child of the soil. From the day when he frees himself from maternal dependence, he draws all his sustenance from mother earth. She yields him the grain which forms his bread, and supports the cattle which furnish him his meat. He learns to regard the soil as the bounteous almoner of Divine beneficence, and feels himself growing into intimate relationship and unity with it. He appropriates it and calls it his own. He reaches his arms around broad acres, and they nurse him, and he fattens in proportion to the nourishment they afford. Seeing that his life is perpetuated by the exuberant productiveness of the soil, no wonder that nations have imagined their existence to originate in it—*autochthones*, as the people of Attica thought themselves—or have fabled a panoplied host, to spring up under the influence of cultivation—as Cadmus, when about to found the city of Thebes, sowed the serpent's teeth, and raised a crop of full-armed warriors, ready for his service.

In a literal sense national character is the growth of the soil. The ancient Egyptians were an agricultural people because they dwelt upon a soil made affluent by the sediments of the Nile. The Athenians were driven from their native country by their sterile limestone hills, to seek the products of Egypt, and Italy, and Sicily, and thus became a commercial people. The scanty soil and rock-encumbered slopes of the Alps make herdsmen of the hardy Swiss; while vineyards and gardens glow with the ruddy fatness which bursts from the genial soils of the Rhenish valley. New England hums with the whirl of a million busy spindles, while the Great West rolls forth the food for New England manufacturers, from her exhaustless granaries of corn and wheat. Massachusetts spins and weaves the wool to which Michigan has given existence. The East elaborates the material—the West creates the material, and feeds both East and West.

Not only is the character of peoples an outgrowth of their soil, but the character and condition of individuals also. Travel across our country and mark the phases of human condition

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which greet the eye. The plain but healthy mountaineer contents himself in his rock-sheltered hut, from whence he and his sons go forth in the morning to tend his herds of sheep and cattle. At the foot of these mountain abodes lies the smiling plain, with its winding streams and sun-lit meadows, and dazzling village walls. The fields are fat with grain; the orchards are redolent with fruit; and the flush and well-fed farmer waits upon the steps to welcome you to a place at his well spread board. But the plain breaks into easy swelling ridges; the soil becomes thin and sandy; the tenacious subsoil retains the water in the shallow depressions of the surface, and only occasional clearings in the piney forest, reveal the rude log cabin, upon the steps of which, in place of the lusty farmer, sits the sorry mastiff, contemplating the pigs and geese which his master's indigence and indolence have failed to fence out of his family quarters. Again we penetrate a region diversified with wooded, fertile plains and rolling hills, whose heads are crowned with the beech and maple and oak, always uttering such welcome tidings of the goodness of the soil in which they have fastened their roots. Sturdy and resolute men have claimed these acres, and attacked these ancient forests. The resistence of the timber to their encroachments, makes them willing to limit their grasp to a few acres each, and these are tilled with intelligent and perserving industry. A tasteful dwelling crowns each rising knoll, and liberal barns and well-filled cribs proclaim that plenty dwells with the master of the premises. The rolling hills subside; the forest vanishes; we stand upon the prairie sea. As far as the eye can reach, no mountain, no hill intercepts the horizon; a limitless meadow stretches around us, with its green undulations succeeding each other in the dim and blue perspective, like the heaving storm-swell of the mighty ocean. Here is no forest to oppose the greed of the unreflecting farmer. The excellence of the soil tempts his cupidity beyond the bounds of propriety, and the tillage due to a hundred acres he wastes upon a thousand. His corn-fields are weedy and dank; his wheat maintains an unequal conflict with the ab-

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original vegetation. But munificent nature refuses to be shamed by the failure which negligent farming deserves, and always returns a praiseworthy crop. Yet, where nature bestows what man has been too indolent or too imprudent to deserve, she still inflicts retaliation, by allowing him to smother his energies, to waste his stern and virtuous manhood, and forfeit the sweets of enjoying the award of conscious desert.

Thus, man everywhere assumes the character moulded for him by the nature of the soil on which he lives. Rocks and hills create good water power, but indifferent crops. They turn the wheel of the artizan, while they wash away the resource of the farmer. The valley and the plain are the abode of agriculture, because there nature has mixed her richest soils, and conserved them for the uses of man. If the plain, albeit, be neglected by nature, sterility reigns unchallenged, and the squalid, driveling, nerveless populations who content themselves with such inhospitable acres, excite the pity of their fellows, while they mirror the indigence of their fields.

If such is the connection between man and the soil on which he dwells, we are all concerned in the inquiries, whence comes the soil? What are the soils on which our individuals and public characters are growing? To what are they adapted? Are they as good as could be desired? How shall we avail ourselves of all their capabilities?

As to the origin of soils and subsoils—this is purely a geological problem; and geology has solved it neatly and conclusively. Ninety-five per cent. of all productive soils is mineral matter. This has had a geological history; its annals are as ancient as those of the granite hills. You may take a grain of the sand which glistens in your soil and contemplate it. Here is a little worn translucent particle of quartz. You may crush it under your foot, or cast it upon the earth, forever beyond the hope of re-discovery. This little particle of quartz existed as you see it before Cæsar conquered the Gauls—before the stone implements were fashioned which we find among the most ancient of the "Kjoekkenmœdding" of Denmark or

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Sweden—before Moses stood upon Mt. Sinai, or Adam fled from the eye of offended justice. It has perhaps witnessed half of the revolutions which the material globe has undergone in the progress of its development. It has lain buried in the midst of cubic yards of solid rock—it has been the sport of the ocean's surges, and danced to and fro for ages upon a shore that has ceased to exist—it has bleached upon the land, bathed by the tears of Heaven, and smiling when again the Heavens smiled upon it. Its fellows, by whose side it lay for numberless years, are far away to the north, glued together in a flinty mountain mass. These innumerable grains of sand with which it is keeping company are all strangers. They have met together only a few thousand years ago, and each is pining for its familiar bedfellows.

There was a time when every atom of this shifting, mobile sand was an element of the solid rock. The mighty agencies which have moulded the world have struck them in fragments from their parent masses, ground them between the mill-stones of the ages, washed and assorted them in the sea, and strewn them over continents for man to dwell upon.

That which is now the surface of the earth has not always been its surface. Continents and islands have expanded themselves to the warmth of the sun, which became afterwards the bed of the sea. Soils which were clothed with the vegetation of a former age, have been sunken where a thousand feet of ocean slime have accumulated upon them, which, in turn, has been changed into a thousand feet of solid rock. Our vast coal measures are but fossil "swamp lands,"—the vegetable debris of a buried age.

But no soil has ever existed upon the surface of our planet at all comparable in utility with that which enwraps the continents during the passing age of man. As the era was drawing nigh when the consummation of the Creator's works was to take place, some striking and unprecedented phenomena occurred. For the use and enjoyment of the human race—at once the culmination of organic perfection and the recipient of

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snper-organic intelligence—a soil was to be prepared that should possess all conceivable adaptations and perfections. The continent was finished, and seemed only to await the advent of the superior being that was to possess it, and subdue the brute natures that had roamed upon it at will. But frost was destined yet to exercise a reign of inexorable rigor, and the sea was permitted once more to career over mountains and plains that had seemed rescued from his sway. The elevations of the polar regions occasioned cold which clothed all the southward slopes with fields of ice. As in the glaciers of the Alps and Greenland, a gradual movement of these icy masses resulted, as we believe, from the diurnal and annual variations of temperatnre. The movement was necessarily southward. The mighty load slid over hill and vale, and plowed the underlying rocks, and heaped up masses of rubbish composed of pebbles and sand and finer materials, which we now find strewn from the Arctic Sea to the Ohio river. This mighty power astonishes us, both with the magnitude of the rocky masses which it has moved, and the unexpected distances which they have traveled. Boulders weighing many tons have been borne for hundreds of miles. A rounded mass of jaspery comglomerate on the University grounds at Ann Arbor, has traveled from the northern shore of Lake Huron, though weighing nearly seven tons. The mines of Lake Superior have exported their native copper into southern Wisconsin and Michigan, and even to the middle of Ohio and Illinois. The immense mass of the rubbish which we call "drift," gives evidence, in nearly every case, that it has been transported toward the south. Its thickness sometimes amounts to three hundred feet or more.

The reign of ice being past, a geological spring-time succeeded. The mountain glacier yielded to the soft influence of the sun, and a thousand rills issued from the bosom of the ice, to wend their way, in ever confluent and increasing streams to the great Mexican gulf, which reached its long arm northward to the mouth of the Ohio, to receive the limpid gifts. Concur-

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rent with these phenomena, the land began to sink. Mile after mile disappeared in the insatiate maw of the exultant sea till America was no more, and superior intelligences mourned that the great and beneficient work which they had watched for so many ages, was engulphed in ruin at the moment when it seemed to have reached its completion. Omniscience felt no such apprehension. Slowly the continent rose from its last sea-burial. As the waters receded down the mountain slopes, they lingered lovingly and dallied with the pebbles on the ever-receding beach. The action of the waves, as they traveled over the land, assorted the drift materials, and in every case the lighter particles, last dropped by the waving strength of the surges, remained upon the surface, and concealed the coarser fragments from sight.

Thus was constituted the basis of our soils. No other soils in the long history of the world have been founded upon a preparation so vast and so complete. The great abundance of superficial materials has caused the rocks to lie for the most part several feet beneath the surface. The depth of this subsoil secures at least two important advantages. First, the droughts of summer cannot dry out the soil, for capillary attraction continually replenishes it from below. Secondly, we have an inexhaustible store of the saline constituents of soils, which are perpetually drawn to the surface with the moisture which rises in obedience to capillary action, and are deposited at the surface, when that moisture escapes in vapor. And then we should not overlook the benefits of that assorting action of the waves which has left the finer constituents at the surface. The slow recession of the sea might have caused a feeling of impatience in the mind of a finite being, as its submergence would have overwhelmed it in disappointment. But the very deliberateness of the operation, is what secured the execution of the omniscient purpose.

The face of the earth was naked and barren. Before the reign of ice it had been clothed with verdure like that which

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now adorns it under the same climatic conditions. I venture the assertion that the germs of that preglacial vegetation were stored away in the masses of drift which overwhelmed it; and that they retained their vitality unimpaired through all that geological winter; and that when the regenerated continent rose dripping from its last ablutions, those germs yielded to the sweet invitations of summer warmth, and came forth in the form of herb and shrub and tree, as in the beginning. They grew and flowered, and went to decay, and their successive crops, mingling their remains with the surface sands, constituted the soils which in this age, yield a supply for all the natural wants of man.

What we have said pertains to the history of soils in general. Our own soils are formed from the remains of rocks which immediately underlie, or form the northern wall of our Peninsula —the barrier which interposes between us and our Canadian friends. Those constituents derived from the northern barriers have been uniformly distributed over the Peninsula; and may be said to constitute the "constant quantity" in our soils. Those constituents derived from the underlying rocks, or those in the immediate neighborhood, introduce the variations, and may be said to form the "variable quantities" in our soils.

The constant quantity is silicoargillaceous. It is derived from those ancient rocks in which silica and alumina form the main constituents, with limited quantities of lime, alkalies, iron and manganese. These substances—silica and alumina—are practically insoluble in cold water, and never disappear under immersion in it. By far the greatest proportion of all these is silica. The finest particles of this substance are the ever present companions of the particles of alumina—insomuch that what is usually denominated pure clay, is more than four-fifths silica, in a minute state of subdivision. The fine impalpable portions of the constant quantity have been to a great extent sorted out from the arenaceous portions, and form beds of clay —so called—sometimes occupying the surface, but generally deeply seated in the drift materials. The arenaceous portions

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of the constant quantity fortunately overstrew the entire surface, and prevent our soils from acquiring that adhesiveness so detrimental in highly argillaceous soils. These sandy particles have been derived from quartzites, granites, syenites and gneissoid rocks, still remaining in place in the regions north and south of Lake Superior, and north of Lake Huron.

The first thing worthy of notice in the soils of the Agricultural Peninsula of Michigan is the universal distribution of the "drift" materials. We find very few naked patches of rock—few areas with so thin a covering over the rock as to be in danger of drying out during the rainless periods of the summer months. The States of Louisiana and Florida, alone, present so few outcrops of the rocky basis of the land. Should it have happened that the geological structure concealed beneath this cloak of drift presented any considerable complication, like that of the mineral Peninsula, it would have been impossible to map it out. As it is, none of the area is lost to agriculture; nearly every acre of the land can be made a cultivated field.

The three leading varieties of soils in Michigan, as elsewhere, are arenaceous or sandy, argillaceous or clayey, and calcareous or limey. These varieties are created by the changing character of the soil constituents which have a local origin. In the vicinity of limestone the soil assumes a calcareous quality, from the destruction of the limestone rock. In the vicinity of sandstone strata the soil becomes arenaceous, and in regions underlaid by shales or slates, it assumes an argillaceous character.

These principles being established, it is obvious that when we have learned the character of the rocks underlying a given region, we have a clue to the nature of the overlying soil; and consequently of its timber and agricultural adaptations. The distribution of the leading varieties of soil in the southern half of the Peninsula, is well determined from observation, and is found to corroborate the statement just made. The northern half of the Peninsula is imperfectly known from direct observation. The geology of the coast region is tolerably well ascertained, but that of the interior is mostly a matter of inference.

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Yet where strata have been so little disturbed, as those of the Lower Peninsula of Michigan, stratigraphical inferences may be received with considerable confidence. I venture the assertion, therefore, that I am able to set in my study and map out the geographical limits of the leading varieties of soils in the northern half of our Peninsula with greater precision than any of our citizens have been able to acquire by direct observation.

The rocky substratum of the Peninsula, is exremely simple. The highest layers of rock belong to the "coal measures," and occupy the central portion. The rocks belonging to the coal measures, are of a mixed character, and consequently produce a soil of little uniformity. Shales alternate with sandstones and limited beds of limestone. A considerable mass of sandstone, which I have styled the "Woodville sandstone," overlies the whole, and where it has not been denuded or washed away, it gives predominance to an armaceous quality of soil. In districts where this sandstone is destroyed, the mass of underlying shale, develops a plastic, argillaceous soil. This, in some instances, is dark colored, and in others, quite light—varying, of course, with the color of the neighboring shales. The soil and subsoil often contain streaks and fragments of coaly matter, which, in all ordinary cases, imply an outcrop, or approximate outcrop, of coal at no great distance toward the north. The slight undulations of our strata bring to the surface, at different points, beds of rock occupying different positions in the series, even without any variation in topographical elevation. The coal measure soils are, therefore, very irregularly distributed. As a group of soils, it may be remarked that they possess a limited supply of lime; while the abundance of pyrites in the shales, introduces considerable sulphate of iron or copperas; and the presence of kidney iron ore in the shales, and of iron-oxyd in the sandstones, introduces a rusty stain in many patches of the soil.

Underneath the mass of coal measures is a bed of sandstone, called the Parma sandstone, whose edges are exposed in a belt around the borders of the coal area. It is the "conglome-

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rate ' of Ohio and Pennsylvania, and the "mill-stone grit" of the English geologists. It is the reservoir of the brine which supplies the wells of Bay City and vicinity. It is well exposed in the township of Parma, in Jackson county, and thence tends northwest through parts of Eaton, Barry, Ionia and Kent counties; and by inference, we trace it through Newaygo, Osceola, Roscommon and Ogemaw counties, to the north side of Saginaw bay. From Sandstone township, it tends in the opposite direction, east and northeast, through Washtenaw, Genesee and Tuscola counties, to the south side of Saginaw bay. This rock, as a whole, is the whitest and cleanest sandstone in the Lower Peninsula, and gives character to a gray, arenaceous soil, entirely destitute of adhesive properties, except so far as they have been introduced by the argillaceous element of the northern drift.

Immediately underlying the Parma sandstone, we find the carboniferous limestone, which may be traced from Newaygo county, through Grand Rapids and Bellevue, to the middle of Jackson county; and thence bending northeast and north, makes its appearance in Huron county, and forms the islands in Saginaw bay. Of its northern curve, we know little, except that it outcrops in the vicinity of Higgins and Houghton lakes, in Roscommon county. This sheet of limestone is not more than seventy feet in thickness, and does not play a conspicuous part in the formation of our soils, except in the immediate vicinity of its outcrops. Moreover, the lower portion of the formation—especially on the eastern side of the State—is highly arenaceous, and the entire mass abounds in nodules and layers of chert or flint. Its contributions to the soil are consequently of a calcareo-silicious character, and forms no well-marked limits to the arenaceous soils of the Parma sandstone.

This limestone is superimposed upon the argillaceous strata of the Michigan salt group—a formation which becomes greatly attenuated in the southern part of the State, but develops a thickness of 160 to 200 feet around its northern curve. It is strongly marked in the western part of Kent county, and

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thence to Muskegon and Oceana counties. Arching around through Crawford, it strikes the eastern shore of Tawas Bay, where the geological survey disclosed the existence of an immense deposit of gypsum, rivaling that in the same formation at Grand Rapids. In the southern portion of the State the tenuity of the formation gives it an unimportant place among the sources of our soils; but toward the north it develops a plastic subsoil, and a surface somewhat rugged from the unequal wearing of the pyritous and magnesian bands of limestone with which the shales are intersected. Besides the immense beds of gypsum which this formation contains, many of the shales themselves are gypsiferous; and it is consequently to be presumed that the soils derived from the formation are not wanting in the calcareous element.

Beneath this repose sandstones which give origin to the belt of arenaceous and pine-covered soils stretching from the Au Sauble, of Lake Huron, through Crawford and Kalkasca counties, to the Manistee. On the south side of Saginaw Bay they constitute the cliffs at Point aux Barques, and underlie the ridge of land extending thence through Huron, Sanilac, Oakland and Washtenaw, to Hillsdale county, whence the outcrop tends through Calhoun and Allegan to Grand Haven. These are the Napoleon and Marshall sandstones—the reservoir of the brine which supplies the wells at East Saginaw and vicinity. These sandstones are generally much stained with oxyd of iron, though locally of a pale buff color—as at the typical locality, Napoleon, in Jackson county. They impress a positive character upon the soils of the region which they underlie. The warm and porous soils of the northern part of Lenawee county are derived from these strata—as well as those of Oakland and Macomb on the one hand, and those of Calhoun, Kalamazoo, Allegan and Ottawa on the other. The sandy and somewhat sterile belt of country reputed to exist in the region regarded as overlying the northern trend of these rocks has undoubtedly been misrepresented. The characters discovered in the immediate vicinity of the lake shores have erroneously been

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imagined to stretch across the State. Every geological indication assigns to the country in question a soil similar to that of Oakland and Hillsdale counties. The exceptions are only of limited extent.

An immense deposit of argillaceous strata—called the Huron group—rests still beneath the Marshall sandstone, embracing the well known black slate of Thunder Bay and Kettle Point. Its northern trend is from Thunder Bay, through Otsego, Antrim and Leelanaw counties. On the south it affords the characteristic clayey soils of Allegan, Van Buren, Kalamazoo nad Branch, reaching even beyond the limits of the State, and curving north again through Lenawee and Wayne. The topography of this belt of country is level and moderately low. The subsoil is always a bluish or blackish, or sometimes a whitish plastic clay—often with disseminated pebbles—and the soil, though generally with intermingled sand, is for the most part tenacious, late to dry out, and quick to feel the effects of dry weather. The abundance of kidney iron ore in the shoals fill the soil with the ferruginous matter, which, after solution, enters into new arrangements in the form of bog ore, shot ore and ochre. This is the only strictly argillaceous belt of the State.

Lastly, we reach the limestone strata, which afford the only well marked calcareous soils of the Peninsula. The carniferous limestone occupies Monroe county, and passing thence by two courses into Ohio and Canada, it reappears on the north side of Thunder bay, and underlies all the region thence to Mackinac. It forms the bulk of Mackinac, Bois Blanc and Round islands, as well as the Manitou islands of Lake Michigan. It is immediately underlaid by the Onondaga and Niagara limestones, the first of which belongs to the lowest salt formation of the State—and which supplies the well at Port Austin, in Huron county. This series of limestones presents a mass of considerable thickness, and gives a marked character to the soil of all the northern region of the Peninsula, and all the islands to the east and west of Mackinac, in the two lakes.

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The soil of this northern limestone region is similar to that of Ohio and Indiana, in the neighborhood of the line separating the two States, and throughout the region stretching east to Sandusky and Columbus. It is a dark, strong soil, and produces excellent crops, as I have been able to observe upon Drummond's and Bois Blanc islands, as well as upon the main land.

Of the physical characters of the three varieties of soils to which I have thus far alluded, little needs to be said on this occasion. The subject is treated in every text book of agriculture. The arenaceous soil warms most rapidly under the solar influence, and retains its heat the longest. The argillaceous soil is lowest in caloric susceptibilities. On the other hand, the last is most retentive of moisture, and the arenaceous the least so. At the same time the arenaceous soil suffers less from drought, because, being so porous, it draws water—so to speak—from the deeper portions of the subsoil. The arenaceous and calcareous soils are easiest to work, but they have the disadvantage of being most easily washed away. Indeed the leaching of arenaceous soils, where the surface is broken, renders it necessary to make more frequent application of restoratives than is necessary in either a calcareous or argillaceous soil. An arenaceous soil is best adapted to a climate subject to extreme vicissitudes of wet and dryness. It is also suited to northern latitudes, from its power of receiving and retaining caloric. I have seen corn averaging twelve inches in height in the northern part of Lenawee county, on the same day that its mean height on the stiffer soils of Washtenaw was but six inches. For the same reason, crops are more forward at Bay City in July than they are in Wayne.

Not more is necessary to be said of the agricultural adaptations and capabilities of these three leading varieties of soil. It is well known that pine timber loves a silicious soil, while the sugar-maple is particularly fond of a calcareous one, and the beech and oak and hickory flourish upon both a calcareous and an argillaceous one. Pine covered soils have a reputation for

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barrenness. This, to some extent, is merited; but in many cases, the stigma belongs to the stagnant water which broods over an impervious subsoil. I have little doubt, as already intimated, that the pine covered belt, stretching across the Lower Peninsula will, at some future day, present as strong attractions for the farmer as the best lands of Shiawassee or Ingham.

In point of salubrity, it is supposed that arenaceous soils surpass the calcareous. It has been observed that epidemics rage most violently in districts supplied with strong limestone water This subject was investigated at the time of the last visitation of cholera, and the suffering of Sandusky City is supposed to afford an illustration of the proposition. In many portions of Mississippi and Alabama, underlaid by cretaceous limestone, the water obtained from wells excavated in it, is unfit for domestic use, and cisterns are employed instead. Our old military post at St. Stephens, on the Tombigbee river, was abandoned in consequence of the insalubrity of the water afforded by the tertiary limestone of the locality. It seems reasonable, however, to believe that the noxious qualities of certain limestone waters do not establish an invariable rule. At Huntsville, in Alabama, the city is supplied by a wonderful stream of pure water, gushing out from a bed of limestone. Chemically speaking, it cannot be doubted that streams percolating through arenaceous strata, imbibe fewer impurities than any others.

I have thus far spoken of soils which have their origin in the general geological structure of the Peninsula. There are others, of more limited distribution, which have had a more local origin. The first to be mentioned are the "swamp lands." These generally possess a soil containing a surplus of vegetable matter in a state of partial decomposition. There are indeed swampy lands of an argillaceous character; and wet lands whose surface soil is even sandy, as is the case with some spruce and cedar covered soils already alluded to. Still, most of our swamp lands are depositories of vegetable acids, and I shall embrace in my account of them, all our accumulations of peat

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and muck. All these beds are intimately connected with the geological history of our Peninsula. They are the connecting links between the present and the past.

I have already called to mind the grand events which accompanied the last great revolution of the globe. We have seen, in imagination, the world emerging in a resurrection from its grave of waters. The waves have glided down the shoulders and sides of the continent until she sat with her feet only bathing in the sea. But the surface of the land was covered with inequalities, and thousands of little depressions held their lakelets of water prisoners in their arms. So the land was at first dotted with thousands of little inland seas. But the clouds cast their burdens of fresh water upon land and sea, and every little pool, raised to the brink of its bounding barriers, poured its salt libations on the land, or sent them on their journeys, over a thousand laughing rills and brooklets to the mother sea. All save a few, some residual pools left by the retreating ocean, were environed by walls so high that, with all the reinforcements of the clouds, their waters could never scale them. They have never given out their brine—and to this day, their saltness remains. Indeed, since precipitation, in these later ages, has not kept pace with evaporation, these inland cauldrons of brine have even become concentrated, and in some cases have precipitated their salt upon the bottom. These are our "salt lakes."

But by far the greater portion of those residual seas found passage-way to the wide ocean. From year to year unnumbered streams transported their saltness to the briny ocean, while the clouds returned them only fresh waters. As the result of this unequal exchange, they lost their saltness, and became lakes. How, let me ask, did their stock of fresh water fishes and molluscs come to take the place of the marine animals which must have been entrapped at the epoch of the receding ocean? And how did it happen that the same species should exist in a hundred different lakelets, separated by bar-

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riers impassable to aquatic breathers? These nutlets are dropped for your mastication.

We follow the history of our lakelets. For ages they received and swallowed up the leachings of the surrounding hills, and their highly calcareous waters precipitated by degrees a bed of fine calcareous mud. To this were added the dead shells of myriads of little molluscs that flourished upon the lime held by the waters. The bottom of each lakelet became a bed of marl. But all around the margins of the lakelet the grasses and sedges were vieing with each other in venturing into the water. The amphibious rushes put them both to shame by raising their dirty heads straight through the slime of the lakelet's bottom. And there they stood—the rushes up to their knees in water, and the sedges and grasses scarcely over shoe. And every leaf and stem which fell upon the water or found its way to the shore, became entangled in the herbage, and lay down and rotted there; and the rush, and the sedge and grass, when November came, bowed their heads in his presence, and wrapped themselves in the cerements that had gathered around them. And thus a soft bed of vegetable mould fringed the lakelet, and overlapped the deposit of marl which was growing beneath the water. From year to year, as the water shallowed about the margins, encroaching vegetation crowded further and further toward the centre of the lakelet. I have not seen the beginning of this process; but at that period of time in which I have been permitted to begin my observations, I find these changes in progress. The little herb standing by the water's brink this year, dies and forms a deposit exactly like that which was formed the year before my eyes or any human eyes detected the character of these vicissitudes; and my logic compels me to reason from that which I have seen to that which no man has seen. And so, I may add, of the changes upon the ocean's shore, until the facts of the passing world are made to illuminate the dark and mysterious chambers of the fossil realm.

Reasoning thus, we are forced to the conviction that many of

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the ancient lakelets have become completely filled. Others are only half filled—others have had the work completed even "within the memory of the oldest inhabitant." What then results on the filling of the lakelet? A marsh—a bed of muck or peat underlaid by a deposit of marl. But the progress is not at an end even when the lake is filled. The surrounding hills still continue to afford lime-yielding water which saturates the muck and deposits its lime; while vegetation still pays its annual tribute to the accumulating stores, till the solid material becomes sufficient to exclude the excess of water. Man then steps in, robs the soil of its marsh grass, and materially retards the process of desiccation, unless he compensates for the robbing by draining off the stagnant water.

Such is the origin of our swamps. Their constitution is such that in agricultural wealth they exceed the most favored uplands. They are immense stores of vegetable nourishment for which the barren hills are groaning. It is evident, however, that for immediate use such soils have little value. They are wet and sour—two vices which can generally be reformed. For the first, drainage and sunlight are the remedy; for the second we must administer an antacid—a remedy most abundant in nature's pharmacopœia; and in this instance brought literally to our hands in the shape of marl. A further beneficial treatment, as you all know, is to plow up the peaty soil, and leave it exposed to the action of frosts and atmospheric air. But this is not the occasion for the common places of agriculture.

There is another variety of soil, intimately related to the peaty, both in its origin and its constitution. This is the upland prairie. This soil is characterized also by its abundance of vegetable matter, existing, however, in a state of complete decomposition, and being already in the form of plant food. Prairie soils are the sediment of a greater lake which has spread its waters over rolling regions capable of draining themselves when the waters receded. Our Peninsula contains but little upland prairie, and that seems to be restricted to the

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south-western portion of the State. Our prairies are mere appendages or outliers of the vast prairie region of Illinois. I have elsewhere discussed the origin of the prairies, and have, in this address, already alluded to the agencies concerned in their formation. They are also connected with the last grand cataclysm of the globe. At the time when a thousand little lakes first began to nestle upon the undulating bosom of our fair Peninsula, the great lakes—giants even at their birth—stood a hundred feet higher than we behold them. We have the proofs of this, but they belong to science. When Lake Michigan was twenty-seven feet higher than at present, its waters flowed over the dividing ridge into the Des Plains and Illinois. When it stood one hundred feet above its present level, it submerged the entire region now covered by the prairies—except perhaps an occasional knoll which stood a grand island in the midst of the waters. Lacustrine sediments accumulated then as now—dark, slimy and abounding in the remains of lacustrine shells. When by the removal of barriers, or the elevation of the land, the waters of the lakes were drawn off to their present level, the lake bottom was left a naked, slimy waste, exposed to those solar and atmospheric influences, which develop the germs of vegetation wherever they exist, upon the gravelly knolls of the drift materials, the seed stored up from the reign of ice sent forth herb and shrub and tree—if, indeed, these were not all in possession of the soil while yet it was an island in the lake. But where the great lake had rested, the storehouse of seeds had become buried beneath a load of lacustrine slime; and the appearance of vegetation had to await the gradual introduction of seeds from without, through the slow agency of birds and winds and waters. But none of these agencies would transport the heavier seeds; and hence the grasses and other herbs first gained possession of the soil—and having gained it, they held it, aided, perhaps by the Indian, against the encroachments of the forest. And that is the reason why the prairies are treeless.

Still another condition of the terrestrial surface, presents it-

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self to the eye of the student of physical revolutions. I refer to the dune sands which border a considerable portion of the great lakes, especially the eastern shore of Lake Michigan. These sands are washed up by the waves, from the rocky outcrops in the bottom of the lake. The Marshall and Napoleon sandstones already alluded to, underlie some of the eastern portion of Lake Michigan, and of course, constitute an abundant source of shore sands; moreover, the Huron group of shales extends under two-thirds the length of that lake; and, as all shales contain a large per centage of sand, these, also, give rise to an additional supply. Nor is this all: few limestones are so pure as to supply, on solution, an inconsiderable amount of silica; and we find, accordingly, that upon those shores of Lakes Huron and Michigan, which are backed by a limestone region, the sands are nevertheless abundant.

The action of storms throws these sands above the mean level of the water, and when the calm succeeds, the sand dries, and the prevailing winds impel the particles, by a kind of hopping motion, toward the interior. This is especially the case along the eastern shores of Lake Michigan and Saginaw Bay. It is ascertained by careful observation that the wind is unable to raise the particles of sand over a barrier presenting a perpendicular face; but where nothing prevents, it will roll them up an inclined plane to an indefinite height. Consequently, the hills of dry sand, soon accumulated, grow higher and higher; or the materials of which they are composed, continually move forward under the impulse of the winds, until gardens, fences, farms and dwellings are buried beneath it, and a fertile region changed to an inhabitable desert. These sands, while in a condition liable to be sifted by every wind, possess, of course, no agricultural value. There are, however, certain grasses and trees which will root in such a soil; and where land is scarce, they may be made to return some compensation for the trouble of planting and cultivation. I shall presently allude to this subject in another connection.

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Another point of view from which the soils of Michigan present themselves to our consideration, is the influence of human agencies upon them. Man possesses the power to leave the impress of his energies upon the face of nature. To a certain extent he controls nature. Not only are the beasts of the wilderness and the trees of the forest subject to his dominion, but inorganic matter is made to yield to his convenience or caprice. His labors change the aspect of the globe; modify its climate; temper or aggravate its storms; and infect or disinfect the atmosphere of wide regions. Old rivers are made to flow in new channels; and new rivers are led for hundreds of miles, up hill and down, in obedience to the behests of commerce. Lakes are drained, marshes are desiccated, the ocean is restrained in his mad encroachments upon the shore, and populous lands are transformed into voiceless wastes, by letting loose the pilgrim sands upon a leeward coast.

The earliest and most pervading agency exerted by man in the modification of the soils of the Peninsula, is the destruction of the forests. Forests are the garments of the soil. They protect it equally from excessive cold and excessive heat. They shelter the snows from the drifting power of the wind, and are thus enabled to await the lapse of the rigorous season of winter, with their feet wrapped in a fleecy blanket. Every autumn they pay back to the soil, with interest, all that the soil has expended upon them. They fend off the burning rays of the summer sun, and restrain the fervor of the atmosphere. They shield the soil from evaporative influences, and maintain an equable degree of humidity. On sloping surfaces they bind together the soil, and resist the denudation of torrents.

All these conditions and results are changed when the forest is removed. The sweeping blast of winter strikes the earth with the fury of an invisible demon—drives off the natural covering of the soil, and exposes the stems and roots of vegetation to an unwonted, and often insufferable trial. The circumstances of spring-time are changed. The soil feels every slight fluctuation of temperature—freezing by night and thaw-

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ing by day—instead of reposing in peaceful shelter under its coat of snow till the advancing season is able to guarantee a vegetative degree of warmth. And then, when summer comes, the burning sun rapidly drinks up the moisture of the soil, and the whole air becomes torrid and dry. Instead of a regular humidity and gentle rains, the agency of man has substituted alternating thirst and floods. And on hill-slopes, where the natural ligatures of the soil have been removed, sudden torrents wash it away and score the earth with ugly and even aggravated gorges and ravines. A most striking example of the effects of clearing a fine and incoherent soil, is seen in the rear of Vicksburg, where ever-recurring torrents have gnawed the hillsides into most unsightly shapes; and whole plantations have been borne into the Big Black and the Mississippi, to navigate their way to the Balize. Similar in kind are the effects upon the gravelly hillsides of our own Peninsula. It is not cropping that deteriorates their soils so much as the action of torrents in transporting the fine alluvial particles to lower levels. In the fine and friable soils of the Gulf States, I have seen thousands of acres completely ruined by precisely such an agency as is at work in Michigan, under the disadvantage of a more gravelly and a more coherent soil.

Such results should be foreseen and provided against. It should at least be required that all abandoned soils subject to wash should be planted to trees, which will eventually restore the surface to its primitive condition, and compensate, to some extent, for the fearful destruction of the native forest which our citizens are perpetually waging. If this matter is overlooked we shall eventually reach the condition of some of the older countries of Europe—fields washed away—villages deserted—population on the wane—and authorities anxious about the diminishing revenues.

Next in importance among the agencies which man exerts in modifying the soil, may be mentioned the systematic drainage of swamps and lakes. The mere clearing of the forest and consequent drying of the atmosphere must contribute greatly to

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the promotion of these results. But ditching and pumping are the direct means by which most is accomplished. It is almost incredible what physical changes are produced in a soil by simple ditching—even where such ditch has no outlet. The swamp is transformed into an upland prairie. The aspect of the vegetation is changed. The oxydation of the organic substances in the soil is rapidly completed, and that which was refuse land becomes the garden of the estate. I need not dwell here upon the utility of ditching, nor the changes which it induces in the soil. There is one idea, however, in connection with drainage, to which allusion may be made, and that is the drainage of lakes. In not a few instances which I have observed, the ditching which would drain a marsh occupying the site of a lake, would equally drain the lake, and thus anticipate the results of perhaps a hundred years of geological progress. When our population becomes more dense, and land proportionally enhanced in value, enterprise will not permit the thousands of little lakelets to nestle undisturbed upon the richest soils of the State. It has been estimated that there are in the Southern third of our Peninsula 1,425 of these lakelets, covering 228,000 acres of the surface. Some of the enterprise, and some of the urgency, which undertook the drainage of Haarlem lake by steam pumps, will eventually be brought to bear in some of our Michigan lakes. The lake of Haarlem was a body of water fifteen miles in length and seven miles wide, and covered an area of 45,000 acres, and was exhausted by the action of three of the most powerful steam pumps ever constructed, working continuously for five years. It is not imagined that any such costly methods of drainage will ever be feasible in the United States; but it is apparent that if the Netherlands could engage in drainage on such a scale, Michigan might find it an object to diminish somewhat the 600,000 acres of water surface formed by our small lakes, if it can be done by the digging of a few ditches. The whole prairie region of Illinois, it will be remembered, is but the bottom of an ancient lake, and the fer-

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tile valley of the lower Mississippi possesses a soil of a similar sedimentary character.

A striking example of the results of human agency is seen in the growth and movement of the dunes; and there are few cases in which the reparative interference of human power is more urgently or more immediately demanded. Just at present, little inconvenience is felt from the encroachments of the moving sands; but the evil is in its infancy; and if not provided against, will reduce to barrenness thousands of acres of the finest lands lying along the western border of the Peninsula. The moveable dunes are the creation of civilization. While the forests stood, the winds were deprived of the power to drift the sands far beyond the immediate coast line. They both sheltered the soil and bound it with their roots. The destruction of the forest opened a broad highway for the travels of the sand. Already we see the dunes encroaching seriously upon the most costly improvements; and the time is coming when their march will force itself upon our earnest attention.

The history and present condition of Western Europe teaches us the tendency of the physical conditions existing upon a dune-producing coast. In Denmark and the adjacent Duchies, in Western Prussia, in the Netherlands and in France, the encroachments of the dunes have for years excited the most serious alarm; and the most energetic measures have been adopted in all these countries to check the progress of the invasion, and as far as possible, repair its devastations. The fixation of the drifting sands, like the protection and restoration of the forests, has been taken in charge by the governments of these countries; systematic experiments have been instituted; scientific commissions and standing bureaus have been charged with the duty of devising means to combat this enemy of the soil; and an abundant special literature has sprung into existence as the result of these public and private efforts. It is not our purpose to recapitulate, at the present time, the amount of destruction caused by the dunes of Western Europe, nor the measures that have been adopted for their fixation. Having directed atten-

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tion to the subject, I shall leave it, with two or three additional remarks. The progress of the dunes, though slow—amounting in Denmark to only thirteen and one-half feet a year—is a steady and certain progress; and in the course of years, has resulted in the inundation of hundreds of thousands of acres of soil. The principal means relied on in Europe for the fixation of the sands is the planting of them with certain grasses and trees adapted to the situation. A favorite grass is *Arundo arenana*—a species which already flourishes spontaneously on the sandy beaches of our great lakes. When the sands have been partially fixed by the grass, the dunes may be planted with trees. In the cold climate of Denmark, the hardy pines, as well as the birch and other northern trees, are found to flourish well, and to yield some profit. So far as we can judge, the pitch pine, often but improperly styled the "Norway pine," (*Pinus resinosa,*) would flourish well in our State upon the dunes, as well as some of our oaks, birches and poplars, and especially the common locust. Some recent developments, however, prove that the very best tree for binding dune sands, and one at the same time extremely tolerant of heat and cold, dryness and moisture, is the Japan Varnish Tree—*Ailanthus glandulosa.* The planting of this tree upon some of our dunes, in connection with the *Arundo arenana,* is an experiment well worth the trial.

We come now to contemplate the soil of our adopted State in another light. If I indulge a little of that feeling of complacence with which Americans have been reproached, you will be predisposed to pardon it. I say it intelligently—I say it with emphasis—ours is a State in which to be content—a State of which we may boast. I have traveled over the length and breadth of our country, from British America to the Gulf, and from beyond the Mississippi to Cape Cod. I have sojourned in nearly half the States of the Union; and yet I never return to our Peninsula State—the Denmark of America—without feeling prompted to utter the exclamation "Michigan, my Michigan!" With a climate infinitely more bracing than that which

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debilitates the swarthy and bilious son of the South, it is yet more temperate than that of other States upon the same parallels. Our soils afford us every variety of crops which flourish in the temperate zone. There is no State which yields better returns of the cereals; and maize is almost equally sure. In regard to fruits it would seem as if Pomona herself had selected Michigan for her chosen abode. I am proud to travel over the north-west and hear the acknowledgment made that for their fine apples they are indebted to Michigan. The same is true of strawberries and other smaller fruits. Behold how nature herself has selected Michigan as the field for the perfection of some of her wild fruits. The raspberry of Michigan enjoys a fame wider than the Continent; and half of the north-west is supplied with our huckleberries and cranberries. And speaking of wild fruits, in the culture of which nature has led the way and set us the example, it certainly is meet that we give due consideration to the nuts of the hickory, black-walnut and butternut. Of all the nuts produced in America, the chestnut and pecan alone, are wanting in Michigan, and the former even, is not entirely unknown. The grape has not yet become a staple article of production; but where the peach will flourish the vine may be successfully reared. Next, in regard to pasturage and hay, I believe no other State can come into competition--other States may export more, and may even produce more; but let it be remembered that the greater part of our State is still under the shade of "the forest primeval." Our stock is unsurpassed. Our horses, I am pleased to learn, are in prime request among cavalry officers. And as a wool-producing State--a character depending on the qualities of the soil--Michigan stands high, with a fair prospect of soon standing preëminent. In the production of maple sugar, moreover, bounteous nature has furnished us with a resource which makes us comparatively independent of cane growing regions.

Unite these qualities of the soil which reward our labor with so abundant a fruitage, with the possession of all that mineral wealth which science and capital have brought to light, and

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which we have good evidence lies still undiscovered, and where is the State that can present equal attractions for capital or for labor? But, though foreign from my subject, I will take the liberty to say that our educational institutions are the crowning glory of our State—the creation of the people who own and till the soil—the product of the wisdom and sagacity of those able legislators who have passed, or are rapidly passing from the stage of active life. It is generally admitted, and cannot, therefore, be regarded as invidious, to state that our system of education is superior in its plan, and especially in its workings, to that of any other western State. Our schools are superior even to those of New England—if we except a few in the larger eastern cities. It is a matter of personal observation with me, that we exact better qualifications in our primary and Union school teachers than are required in Connecticut and most parts of New England and New York. New England teachers make many failures in Michigan. I am sure you will pardon me if I give public utterance to a sentiment which is in every heart, that a great degree of the success which our educational system has achieved, in its actual working, is due to the efficiency of the Normal School, and the faithful and enlightened labors of that public officer who has been at the head of the system during the past six years.

But I have not yet said all. This exuberant soil—this material wealth—these wise laws and excellent institutions, impress a character upon our population. Michigan is not the asylum for indolence and vice. Those only are tempted within her borders who can bring honesty and industry along with them. Such labor, and are rewarded. They acquire honest wealth, and are content. This is no boast. The fact was unsuspected by me, until travel and observation forced it upon my attention. How do Michigan soldiers compare in physical, moral and mental character, with those of other States? I am happy to have some direct testimony on the subject from high authority. Major General Butterfield declared to me, last winter, of his own accord, that no State save Massachusetts, sent to

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